SECONDARY STUDENTS' UNDERSTANDINGS OF HEALTHY DIET: A COMPARATIVE STUDY IN GREECE AND ENGLAND

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ABSTRACT

This study looks at the nutritional literacy of 20 Greek and 20 British students who were about to complete higher secondary education. The meaning of a balanced diet is discussed and a model is proposed according to which a balanced diet aims at the promotion of the overall health of the individual and not only the prevention of diseases. The various social psychological theories that have been used in surveys and health interventions are reviewed.

Nutritional literacy is analysed with regard to four issues: understanding of health, understanding of a balanced diet, ability to make informed food choices and ability to describe and comment on one's own dietary habits. For the exploration of these issues, an interview was selected as the research instrument because it is resilient and can focus on each subject's views. The schedule of the interview was developed through three series of pilot interviews. The data collected were analysed qualitatively, but some statistical methods were also deployed.

Students defined health positively, i.e. in terms of good health rather than the avoidance of ill health, and referred mainly to bodily health. They spoke about habits that we must adopt rather than about habits that we must avoid. Diet and exercise were the most often reported health-promoting habits.

For most of the students, bodily growth and good looks were the aims of a balanced diet. Some students reported the prevention of cardiovascular diseases through diet, but most of them ignored the links between the type of diet and cancers of the digestive tract.

Some students interpreted nutritional information in a way that reflected their own strongly held views about the nature of a balanced diet. Students' views and their ability to plan a balanced diet were characterized by high accuracy but low comprehensiveness. Finally, students were rather selective in the description of their own diet. Most of them reported that they are more or less committed to a healthy diet. However, they did not identify this commitment as a precaution against ill health.

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ABBREVIATIONS

BMI:	Body Mass Index
BSE	Bovine Spongiform Encephalopathy
CHD:	Coronary Heart Disease
CJD	Creutzfeldt-Jakob Disease
CTA:	Cue to Action
CVD:	Cardiovascular diseases
DoH:	Department of Health
DOIT:	Diffusion of Innovationss Theory
EAR:	Estimated Average Requirement
F&V:	Fruits and Vegetables
GOC:	Grades of Categorization
GP	General Practitioner
HBM:	Health Belief Model
HEA:	Health Education Authority
HLC:	Health locus of control
HPM:	Health Promoting School
IAA:	Indispensable Amino Acids
K.S.:	Key stage
LDL:	Low Density Lipoprotein
LRNI:	Lower Reference Nutrient Intake
MUFA:	Mono-unsaturated fatty acids
NSP:	Non Starch Polysaccharides
PUFA:	Poly-unsaturated fatty acids
Q.:	Question
Qs:	Questions
RDA:	Recommended Dietary Allowance
RNI:	Reference Nutrient Intake
SCT:	Social Cognitive theory
SPTs:	Social Psychological theories
STD:	Sexually transmitted disease
SFA:	Saturated Fatty Acids
StD:	Standard Deviation
TORA:	Theory of Reasoned Action
WHO:	World Health Organization

INTRODUCTION

In the last twenty or so years the trend to enrich secondary science syllabuses with issues about life, society and technology has gained ground in many European countries. Two reasons have perhaps necessitated this trend. The first had to do with the growing demand for schools to provide knowledge and skills, useful in everyday life. This pressure mainly came from groups and institutions other than schools and educational organizations. The second reason was that the number of pupils who appeared to lose interest in science was increasingly being seen as a matter of great concern.

In this context the issue of healthy eating has been seen as one of great importance which deserves a place in any issue-laden syllabus. This importance stemmed at least in part from the progress made by modern dietetics and by the consequent usefulness that the findings and guidelines of dietetics is seen to have for the lives of the students and those of their present and future families.

The author comes from a country, Greece, in which this trend has not been broadly adopted to a country which was among the first to implement issue-laden syllabuses, i.e. the U.K. Especially as far as the issue of healthy eating is concerned he had the chance while in the U.K. to study and evaluate the procedures of a very innovative educational material called "What did you eat ... ?", which was part of the "ASE Science Across Europe" project. In the "What did you eat ...?" unit secondary school students were involved in learning about the links between diet and health, in recording their eating habits and in exchanging their findings about these habits with students in other European countries.

Although this was not seen as an effective strategy for learning about healthy diet either by its producers or by its users, it was however a clever tactic to involve students in a genuine discussion about healthy eating. This conclusion gave the author the idea of conducting the research described in the following pages. His motive was to investigate how students in the final stage of secondary education perceive the relationship between diet and health and to what extent they are able to make healthy dietary choices.

"But what is healthy eating?" many people wonder. And some others might go further in asking: "How do we know that by eating properly we are going to be more healthy?". Nutrition and dietetics are empirical sciences that promote public health. The two papers discussed below indicate how beneficial the impact of dietary interventions on public health may be. Far from saying that these are the definitive findings that prove beyond any doubt the validity or infallibility of nutrition and dietetics, these papers can be seen as good instances illuminating the methods, successes and limits of these sciences.

In 1969 the Institute of Nutrition of Central America and Panama launched an experiment: a nutrition intervention in four small and poor Guatemalan villages. The purpose of the experiment was:

> "...to test the hypothesis, in vogue in the 1960s, that malnutrition retards mental development. Researchers operationalized the study as an assessment of the impact of significantly improving protein intakes in mothers during pregnancy and lactation and in children during the first 7 years of life" (Martorell 1995, p. 1128).

So in two of those villages a drink containing high quality proteins as well as some vitamins, calcium and phosphorus was distributed to the target group, i.e. pregnant women and children from 0 to 7 years old. This drink was called Atole. In the other two villages, which had similar socioeconomic status and ethnic composition, another drink was distributed to the same target group. This drink, which was called Fresco, contained sugar, flavouring and a more restricted range of vitamins. So the two types of drinks differed in the fact that Atole contained proteins, a greater amount of energy, phosphorus, zinc, vitamin B-6, folacin and vitamin B-12. The distribution was organized to take place in similarly attractive premises and the participation of the villagers as well as the amounts of supplements consumed were recorded continuously.

In conjunction with this intervention two studies were carried out. The first one was a longitudinal one, which took place from 1966 to 1977, roughly coinciding with the intervention, and the other a follow-up study, from 1988 to 1989. Both are summarized in the Martorell 1995 paper. One of the most striking findings of the longitudinal study was that:

> "The prevalence of severe stunting was about 45% in both Atole and Fresco villages at the beginning of the study in 1969 and declined at the end of the study, in 1976-77, to 20% in Atole villages but remained at about the same level in Fresco villages" (ibid p.1131).

It was also found that infant mortality rates declined by 66% in Atole villages and by 24% in Fresco villages, when for the rest of rural Guatemala the decline was 19% over the same period.

The subjects of the follow-up study were aged 11 to 17. The mothers who had been fed the Atole and Fresco drinks were not examined. Findings included the fact that adolescents and adults fed on the Atole supplement were taller, heavier and had greater fat-free masses compared to those fed on the Fresco supplement. The maximal oxygen consumption, an indicator of work capacity, was significantly greater for males in Atole villages. The effects on mental development of the participants were also important:

> "At the follow-up, when subjects were 13-19 years of age, Atole exposure was significantly related to tests of knowledge, numeracy, reading and vocabulary and, to a lesser extent, to information processing. No relationship was found on the other hand, in terms of intelligence ... In terms of the interaction with maximum grade attained, Atole can be characterized as an enhancer of the educational returns to schooling. Atole exposure markedly improved the performance of those with more schooling but had little effect in those with only low levels of schooling" (Ibid p. 1135).

In another article titled: "Dietitians' contribution to cholesterol education: A decade of progress", L. Van Horn *et al.* (1995) present some epidemiological data collected by the American National Health and Nutrition Examination surveys concerning the course of the population's heart health during recent decades. Here are some interesting points:

- Total fat intake and saturated fat intake declined from a high of 36% and 14% respectively, in 1976 to 1980 to population means of 34% and 12% in 1988 to 1991.
- Mean total cholesterol level decreased in American adults from 5.5 mmol/L in 1978 to 5.3 mmol/L in 1990.
- The mortality rate for coronary heart disease has continued to decline.

From the figures given in the same article we deduce that the rate for coronary heart disease declined from 225 per 100,000 in 1972 to 125 in 1992. These are age-adjusted values. Before commenting on these data it is useful to mention that according to nutritional conclusions high concentration of cholesterol in blood is considered as a risk factor for developing cardio-vascular disease (CHD). Similarly, diets rich in fat, and especially in saturated fatty acids (animal fats), contribute to raising cholesterol levels in the blood and to obesity. Obesity is another risk factor for the same disease.

The correlations of the improved dietary habits and the ensuing decrease of cholesterolaemia among Americans with decreasing death rates from CHD are strong indications that:

1. The pinpointing of high concentration of cholesterol in blood and obesity as risk factors of CHD is correct.
2. The goal set for informing populations about those risk factors with a view of improving their dietary habits is both attainable and has already starting giving positive results.

Other factors, like an increase in the percentage of population that exercises, may have contributed to the decline in death rates. This is one reason why we cannot deem those results as proof of the validity of dietitians' recommendations but as a strong indication for it.

Another characteristic of those two papers is that they refer to two diverse types of societies. In the first one the intervention was applied in a developing country. In the second the statistics are taken from an affluent society. It seems that dietetics is vital for both those societies. And for each one of them dietetics have a distinctive role to play.

These two instances from the literature have been cited in order to show that questions like those posed in the first page of this introduction ("What is healthy eating?" and "To what extent does proper eating secure health?") can receive cogent answers. It is interesting to see how students who have completed their general education, just one step before starting vocational training or tertiary education, answer these same questions.

Formal education is not the only source of knowledge for health-related behaviours. As common concern about health increases, health-related behaviours are very often the subject of public debates, campaigns, media documentation etc. Adolescents, the target group of this research, are at an age to participate in the dialogue and the dissemination of information about these issues. So their ideas about health-related behaviours generally, and diet in particular should not be attributed to their formal education alone. However, their formal education, especially the secondary phase, might have been expected to have helped them in:

- clarifying the need for a healthy diet, i.e. to make them aware of the relationships between dietary habits and good- or ill-health;
- comprehending, internalizing and logically organizing their knowledge about healthy diet.

These are exactly the points that this study focuses upon. It is mainly about adolescents' ideas, and secondarily about their practices. Not because ideas matter more, nor because positive ideas necessarily match positive behaviours. But it is very important for young people to be able to make informed choices that are consistent with their life-styles, values and preferences whenever they feel that they have to make them and the challenge for formal education is to make them aware of the necessity to make these choices.

The principles and practice of this study are reflected in the layout of the present thesis. The study was partly theoretical and partly empirical. Similarly, this thesis consists of two major parts: the theoretical one (Chapters 1 and 2), and the part dealing with British and Greek students' understandings of healthy diet (Chapters 4 to 7). In between, Chapter 3 describes how the theoretical issues were progressively incorporated in the instrument used in the main fieldwork through some pilot studies.

The first two Chapters approach the issue of healthy lifestyle and healthy eating in particular from two perspectives: the perspective of nutrition and formal education and the perspective of lay people. The discipline of nutrition attempts through media campaigns and formal education to teach people a health-promoting lifestyle. This teaching filters through the social milieu and people perceive it and are affected by it in a way that fits their values, preferences and psycho-mental status. The representation of such an intricate and multifaceted interaction can never be objective. The author's views on some key issues like the nature of health and the nature of learning set the perspective from which this interaction is depicted and interpreted.

The methods Chapter focuses on the objectives of the study, the way that the instrument was developed and the details of the sampling and other procedures of the main fieldwork. The perspective of the study is also compared with the perspective of similar studies elicited from the literature.

Chapters 4-7 present the findings of the study, grouped in four units: the students' ideas on health, their ideas on healthy eating, their abilities to use their knowledge and beliefs in making sound dietary choices and their own review and comments on their eating habits. The analysis of these data is partly qualitative, by concentrating on what each student said, and partly quantitative, looking for general trends of thought. The quantitative treating of the data allows for some comparisons to be made between British and Greek students, and between girls and boys. These data are discussed and suggestions are made for making nutrition education more relevant to students' attitudes and promoting the overall health of the individual in his/her milieu.

Chapter 1: EATING WELL FOR WELL BEING

1.1 Introduction

Taking care of our diet demands efforts. For most of the people who live in affluent societies it demands self-restraint and moderation as far as intakes are concerned. For other people in such societies it means trying and persevering in new dietary habits which is not always pleasant. **To what extent are such efforts justified by the ends and what good reasons do lay people have for going through these efforts?** This Chapter is an attempt to answer this question. First the concept of health is clarified. Then the essential suggestions of mainstream nutrition are set forth in conjunction with the goals that they are supposed to serve. The answers to the questions set above are given after a brief review of the ways in which nutritive suggestions are popularized. The Chapter closes with a focus on nutrition education in British and Greek secondary schools, specifically as it is approached through science and health education.

1.2 What is health?

1.2.1 Definition of Health

A plausible question that comes up when speaking about healthy diet is "what does health mean?" In seeking an answer to this question one can either leave nutritionists to drive one to the health that they aim at, or one can try to define health in advance, based on hygiene, biology and humanities, and after that (one can) collate nutritionists' health to that original definition. This second method will be followed here because it has a wider scope and involves clear-cut objectives.

> "Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity" (cited in Downie *et al.*1992, p. 9)

According to this definition by the World Health Organization (WHO) there are two different attributes of health: the positive, i.e. well being, and the negative, i.e. absence of diseases. The phrase "not merely the absence..." denotes that those attributes are seen as different in that the existence (or lack) of the one does not necessarily determine the existence (or lack) of the other. However, the possibility of one of them being affected by the other is not precluded in this definition. As for the constituents of human existence this definition recognizes the physical or bodily, the mental and the social ones. According to this definition someone is healthy as far as s/he is bodily, mentally and socially well and has no bodily, mental and social defect.

This definition dates back to 1946 and since then it has been reviewed on different occasions. The 1977 World Health Assembly set an ambitious target with the policy named "Health for All by the year 2000" which is "the attainment by all peoples of the highest possible level of physical, mental and social well being" (cited in Tones & Tilford 1994 p.2). It is obvious that the emphasis on health for the World Health Assembly in 1977 differed from the WHO's later definition: from pursuing the positive and avoiding the negative attributes of health, to pursuing the positive only. In addition, by introducing the notion of "levels of well being" this definition renders health as a quantifiable entity, not as an absolute one.

Another problem that often comes up with matters of health is if and how the health of the parts determines the health of the whole. For instance what about those people who, though having a physical handicap, lead a life full of action, feelings and social relationships? Should they be characterized as not healthy people? It is obvious that according to the definition given by the WHO they should be categorized as such, but from another point of view quite unjustly so. G. Schaeffer has attempted a different approach to the concept of health which may provide a satisfactory solution to that problem. He posits that the "human system" consists of five parts: (1) physical, (2) mental, (3) social, (4) environmental and (5) transcendental. These parts or even smaller subdivisions (like cells or organs) may sometimes be neglected or suffer a disease whilst the total human system remains healthy and maintains its elasticity, its ability to "exert strong regulating forces" on the parts, a status which

Schaefer calls "biological equilibrium". Health is, according to this kind of thought, of two orders: the health of the whole and the health of the parts. The health of the whole seems to be dominant over the health of the parts and (health) is now seen no longer as a condition but as a dynamic process:

> "Health is the successful reaction to disturbance in a living system" (Schaefer 1987a p.18).

The final argument that Schaefer puts forward in order to support this stance is that since the lack of any disease can never be achieved it is finally more realistic to speak about the ability to react to the unavoidable disturbances than about a state of complete well-being.

The concept of biological equilibrium is tackled by Downie and associates but with a different meaning. They suggest that:

> "...health entails an appropriate balance of the physical, mental and social ingredients: over concentration on one may be to the detriment of either or both of the others" (Downie *et al.* 1992, p.23)

The same authors have a different view about total health than the one described by Schaefer. For them health is "the sum or product of all its components". Since the exact measurement of this type of health is impossible they state that instead of defining the absolute value of one's health it is more meaningful to concentrate on how to increase the overall 'quantity' of health by enhancing positive health and reducing illness.

Schaeffer's and Downie's views are not contrary to each other, they are rather complementary. The first one is a holistic way of experiencing health. It is an attitude that people are called to develop, which will be a vital asset for their lives. The second one is the objective way of assessing the parameters of health, which is useful for scientific research and for developing strategies aiming at ameliorating the health of individuals and communities as well.

Finally, this is a more subjective understanding of health:

> "By health I mean the power to live a full, adult, living, breathing life in close contact with what I love - the earth and the wonders thereof - the sea - the sun. All that we mean when we speak of the external world. I want to enter into it, to be part of it, to live in it, to learn from it, to lose all that is superficial and acquired in me and to become a

> conscious, direct human being. I want to be all that I am capable of becoming so that I may be ... a child of the sun" (cited in Farley 1987, p.154)

A **synthesis** of the different understandings of health that have so far been reviewed can be like this: Health is the absence of diseases and the state of feeling and performing well. Health regards all the parts of human existence which are the physical or bodily, the mental, the social, the transedental and the environmental. Overall health means the maximization of the health of all the parts in a balanced way and the will and strength to oppose any disturbance of the acquired health.

1.2.2 Health factors

Health is very closely associated and frequently examined together with the concept of health promotion. In the 1986 WHO document known as the "Ottawa Charter" both of those concepts underwent a radical evolution. Health was seen as a means by which people can achieve a socially and economically productive life. The acquirement of that means, i.e. health, is not left entirely to individuals but is entrusted to conscious and active communities as this process is basically seen as a political action. As Tones & Tilford point out:

> "Health will not be achieved nor illness prevented and controlled unless existing health inequalities between nations and social groups have been eradicated" (Tones & Tilford 1994, p. 4)

The same authors comment on two national health policies that have followed the Ottawa Charter. The 1988 US Department of Health and Human Services document "Objectives for the Nation" prioritizes 15 areas for disease prevention and health promotion (the negative and positive attributes appear again), of which "two thirds are addressed to environmental measures or health care systems" (Tones & Tilford 1994, p. 5). An equivalent 1992 document from the English Department of Health after mentioning the need for public policy, healthy surroundings and proper legislation focuses on action that must be taken against common lethal diseases and accidents. For Tones and Tilford there is a clear divergence between the emphasis of the two policies: for the first it is the socioeconomic environment whereas for the second it is the medical care for the individuals.

One can wonder whether public policies and medical care for the individual are the only factors that determine health. Downie and associates have developed the "health field concept" which attempts to give an answer to this last question. According to this, health is the product of four factors: (1) genetic factors, (2) individual lifestyle, (3) health services and (4) the cultural, socioeconomic and physical environment (Downie *et al.* 1992). For the author of this thesis though, factors 3 and 4 are very difficult to distinguish; in fact it can be said that health services are part of the environment. On the other hand, an individual lifestyle is not independent from genetic factors. Recently the origins of a great number of tendencies of habits have been traced back to people's DNA, that is to say, many of the habits that we acquire in our lives may have a genetic triggering. Another possible amendment of the "health field concept" is that genetic factors and individual lifestyle are not independent of the environment. In biological terms phenotype depends on genotype and the environment. So health and/or disease depend on the interaction between genetic factors and environment. And of course for the acquisition of our habits our milieu plays a very significant role.

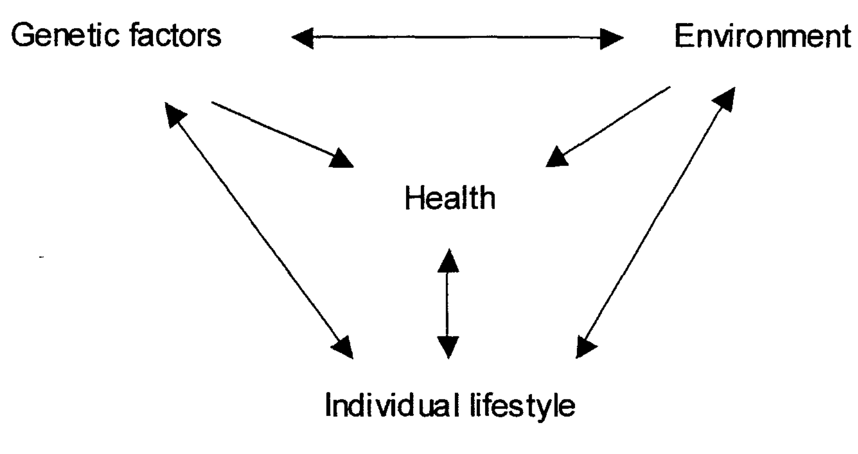

Figure 1: Factors affecting health

The schema in Figure 1 is put forward as a synopsis of the factors that affect our health: genetic factors and the environment are the primary factors that affect health both positively and negatively. Individual lifestyle also affects health though it can be seen as an outcome of the interaction between the environment and the personal characteristics. One can support the view that the environment is affected by our individual lifestyle. This is true to some extent. Certainly our 'microenvironment', i.e. our home, relationships etc, is affected by our individual lifestyle but our "macro-environment" like health services, air quality, economic situation etc. are only marginally affected by our individual efforts. The macro-environment is more likely to be affected by the lifestyle of populations rather than of individuals. To what extent our health is determined by each of these factors is a question that cannot have a general answer. There are conditions, like Down's syndrome, that are absolutely dependent upon genetic factors. Other conditions like stunting are often simply the result of environmental conditions. And the "sporty" life (as a determinant of good health) is an outcome of both the (socioeconomic) environment and the preferences of the individual. If these are the factors affecting health, then we can conclude that any strategy that aims at improving people's diet will have, to be more effective, to use both platforms, i.e. implementing general policies and focusing on the individual. Any general answer that does not take into account special cases is a rather ideocratic stance with limited operational value.

1.2.3 Health from a nutritionist's point of view

Rosenberg reflecting on the Recommended Dietary Allowances (RDA) for the USA population says that those were defined in 1974 as the "levels of intake of essential nutrients that on the basis of scientific knowledge are judged... to be adequate to meet the known nutrient needs of practically all healthy persons" (Rosenberg 1994, p.1777). In 1989 the RDAs are characterized by the Authority that propounded them as "neither minimal requirements nor necessarily optimal levels of intake..." because " it is not possible at this time to establish optima". So there is a shifting from a practical and utilitarian target (meeting the needs) to a more abstract and presently unattainable target of "optimal health". How possible is it for us to achieve this target in the future?

In order to answer this question Rosenberg analyzes the concept of "optimal health" as having two possible meanings. The one is optimal function and the other is optimal prevention of diseases. The first one, he argues, cannot be determined because we cannot take into account the variability of gender, age and genetic endowment for a whole population. The second possible meaning of optimal health, i.e. optimal disease prevention, is also judged as unfeasible on the same grounds of people's heterogeneity and on the necessity for "continuous research on nutrition and health promotion"[1].

Compared to the definition of health that has been described in paragraphs 1.2.1 and 1.2.2, 'Rosenberg's health' is less comprehensive. Although he distinguishes between positive health and diseases, he never tackles the impact that diet may have on the different constituents of the human being. One might argue that since Rosenberg does not refer to specific constituents he may refer to the whole human being, but sentences like the following reveal the opposite:

> "Optimal function may be measured with respect to physical performance or immune responsiveness" (ibid p. 1778).

There would be no good reason to concentrate so much on the thought of one nutritionist if his thought was not representative of the thought of the people of his discipline. But because this way of thinking is the common, though implicit, rationale in the science of nutrition it is worth pondering.

It would be unfounded to conclude that since Rosenberg does not speak about mental or social health he does not recognize them as playing an important role in human well-being. What would be interesting to know though is how Rosenberg relates nutrition to these aspects of health. Do they relate straightforwardly, or through physical health (i.e. physical health supports a healthy social and mental life), or do they indeed have nothing to do with it? These are questions that unhappily seem generally to be irrelevant in the context of nutrition discipline.

Nonetheless, Rosenberg draws near to the understanding that Downie and associates have developed about the cumulative nature of health (see paragraph 1.2.1): Total health is based upon the health of the parts and our increasing knowledge about the ways that we can make the parts healthier pledges for the improvement of total health:

> "...I expect that our knowledge will continue to grow, and I hope that our wisdom will be capable of making recommendations about nutritional requirements that grow with that knowledge" (Rosenberg 1994, p.1778)

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[1]This is of course an esoteric argument. If optimal prevention was ever to be achieved there would be no need for further research on this field.

1.3 About food and nutrients

1.3.1 The nature of the discipline of nutrition

Knowledge about the impact of food on people's health is continuously updated. This in fact happens in any other scientific discipline but in nutrition this feature is more prominent because nutrition is one of the most recently developed sciences. For instance, it was only in 1908 that Ignatowski experimented on rabbits to pinpoint the cause of atherosclerosis. He concluded that it was animal protein that led to atherosclerosis. In 1912 serum cholesterol was first considered as an atherogenic factor (Kritchevsky 1995). Today nutritionists agree that serum cholesterol is determined by genetic and environmental-habitudinal factors though to what extent still remains an unresolved problem.

The **methods** deployed by the discipline of nutrition in order to study the impact of dietary habits on people's health and the kind and consistency of knowledge acquired by these methods are a good indicator of its value and usefulness. What follows is an overview of these methods with a few foci that help to illustrate the kind of debate that is currently going on. Nutritional studies can be categorized at three major levels: epidemiological, physiological and molecular biological.

Epidemiological studies include international correlations, case control studies, cohort studies and controlled trials. International correlations, although indicative, are not absolutely conclusive on their own as the populations under comparison will differ not only in their dietary habits but in other variables as well. Case control studies consist of portraying the eating profiles of people who have developed a disease (cases) and of people who have not (controls). Of course this process may involve a certain amount of bias on the part of the researchers who select the individuals, and on the part of the respondents who may give answers affected by their state and awareness of health. Cohort studies monitor the diet and health of a great number of people for a long time and look for possible correlations between illnesses and dietary habits. They are obviously the most neutral of all but at the same time are very demanding in time and money. Randomized controlled trials constitute an attempt to apply methods of the laboratory in society. In this approach a group of people are fed according to the researchers' prescriptions, and the health of the intervention group is usually compared to that of the underlying population. This last type of search is characterized by Burr (1994) as "the most conclusive type of evidence". However, ethical considerations mean that research on humans, even human volunteers is limited in terms of what possible effects of diet can be investigated.

Physiological studies are based on hypotheses expressed in the light of epidemiological evidence. These hypotheses are usually of the type that 'the effect of food x on health is attributed on one or more of the nutrients contained in it'. Consequently the physiological action of the specific nutrient(s) is studied in vitro, i.e. in cultures of cells and in vivo, i.e. in animals. The action of inositol hexaphosphate (phytate), which is ubiquitous in the plant kingdom, was studied, for instance, after striking epidemiological evidence that fruit and vegetable consumption prevents the development of cancers of the gastrointestinal tract. In a series of studies it was proven that phytate has a high "anticancer potential (preventive as well as therapeutic)" (Shamsuddin 1995). In vitro it was shown that phytate is rapidly taken up by malignant cells, reduces cell proliferation and can also increase differentiation so that malignant cells can revert to cells of the normal phenotype. In vivo it was shown that phytate is quickly absorbed from the stomach and upper intestine of rats. So, this type of study connects specific intakes with specific outcomes. The mechanisms that result in these outcomes are studied by molecular biology.

Molecular biological studies are, for the time being, the least advanced studies in nutrition but it seems that they may be the most promising ones. Here the focus of interest is the interaction between genetic and environmental-habitudinal factors. For instance, we now know that arylamines, which are heterocyclic amines produced in large amounts in cooked proteins have a high DNA-damaging potential during their metabolism. DNA damaging can in turn result in carcinogenesis. This gives us one possible explanation for the fact that in societies where diets rich in meat prevail, there is a high incidence of cancers of the gastrointestinal tract. We also know that hypomethylation of DNA appears to be an early stage in carcinogenesis and that chronic methionine, choline and folate (vitamin B_{12}) deficiencies may result in changes in DNA methylation. So this type of knowledge both explains the findings of epidemiological and physiological studies and suggests certain improvements in our diet patterns.

The real challenge for the discipline of nutrition is the integration of the findings of epidemiological surveys and physiological and molecular biological studies. The more coherent the findings across these three levels, the greater the validity of nutritional recommendations. As J. Potter (1993) points out:

> "It is worthwhile examining both the coherence and interdependence of the levels of explanation, not as a sterile exercise, but because of its heuristic value..., its capacity to shape a research program and its potential as a model for studying cancer etiology in general" (Potter 1993, p.418).

1.3.2 Prescribing nutrients

Current advice on nutrient intakes is based on influential documents including the WHO 1990 report titled "Diet, nutrition and the prevention of chronic diseases" regarding developed as well as developing nations and the Department of Health (U.K.) 1992 report titled "Dietary Reference Values for Food Energy and Nutrients for the United Kingdom". Details of these documents are given in Appendix 1. In the same Appendix some additional information is given for the role of each nutrient i.e. how essential they are and their physiology. The purpose of this overview is to provide the context for the empirical study described later.

The main points of this overview in regard of the **macronutrients** are the following:

1. Energy requirements differ with the age, the gender and the activity of the individual. They range between 8 and 11 MJ. For Great Britain these values have been recently slightly lowered as a means to reduce the number of overweight people.
2. Protein intakes should provide no more than 15% of the total energy intakes. No adverse effect is found to be caused from the consumption of protein except ketoacidosis which is caused when protein is the only energy provider nutrient for long periods.

3. Fat intakes should represent 5 to 35% of the total energy intakes depending on the socioeconomic situation. Saturated fatty acids though should not exceed 10% of total energy intake. The diseases that have been linked with fat over-consumption (especially saturated fatty acids and cholesterol) are cardiovascular diseases, some types of cancer, obesity and (via obesity) non-insulin-dependent diabetes.
4. Sugar (sucrose) consumption should be kept as low as possible so as to avoid obesity and dental caries.
5. Starch intakes should make up for the 50-70% of the total energy needs.
6. Fibre or non-starch-polysaccharides should be taken in in quantities of 18-22 g daily. Many studies have related the lack of dietary fibre to constipation which, apart from being an undesirable condition is also a risk factor for bowel diseases like colon cancer and diverticular disease and for gallstones. When fibre is taken in in great dosages it may interfere with the absorption of many trace elements.
7. Each one of the above mentioned macronutrients except sugar are essential and cannot be substituted in diet by other nutrients.

The main points of this overview regarding the **micronutrients** are the following:

1. Vitamins are involved in metabolic reactions and their deficiency impairs growth and causes various diseases.
2. Different vitamins are usually found in different foods, which can be either plant, or animal foods.
3. A minimum intake of fatty foods is essential for the provision of fat-soluble vitamins.
4. Some vitamins act synergistically with other vitamins and some others act synergistically with trace elements.
5. Some vitamins are vulnerable to high temperature, oxidation and in certain pHs.
6. Some vitamins protect cells from oxidative processes. Oxidative processes are believed to trigger DNA damage and atheromatosis, which respectively may lead to cancer and cardiovascular diseases. Vitamins C and E are antioxidative ones although vitamin C sometimes has an oxidative role as well.

7. Taken in excess, some vitamins have adverse effects.
8. Metal and non-metal trace elements are involved in metabolic reactions and also have a structural role in bones and cells.
9. Some trace elements are found in plant foods and some others in animal foods.
10. Metals like iron and copper are believed to strengthen immunity. Iodine helps mental and physical performance.
11. Sodium intakes are positively correlated with the development of hypertension.

1.3.3 Conclusion about nutrition recommendations

In nutrition as indeed in any other scientific discipline, nothing is considered as definitively proven knowledge since a complete unanimity for each nutrient at each level of study (epidemiological, physiological and molecular biological) and across the levels has not yet been achieved. Perhaps this unanimity is very difficult or impossible to achieve as we do not eat distinctive nutrients but foods containing huge numbers of nutrients that act sometimes synergistically and at some other times antagonistically. Perhaps we have not as yet posed the right questions. But even if a complete consensus over the physiological effects of each single nutrient for the time being has not been reached, there is enough consensus over the general patterns of diet that can bring about better public health and reduce the toll of the most common chronic diseases. Even if the picture of the interaction of food with the human organism has not been restored in full detail, it is there anyway, and it is comprehensible, coherent and eloquently didactic. To turn a blind eye to it is not the best thing that we can do for public health. For all the open questions and inconclusive answers in nutrition, a great degree of consensus has been achieved in many areas and this consensus has in some cases already born fruits (see introduction).

This nutritional concordance, put in a nutshell, reads as follows:

- **Moderate** total energy intake, reflecting the needs of each individual (see Sections A.1.1.1, A.1.1.3 and HEA 1995 p25-6, MAFF 1995 p. 150, Καραμάνος 1995).

- **Proportional** intakes of macronutrients, i.e., more starchy foods, enough dietary fibre, moderate protein foods and few fats (especially saturated fatty acids), sugar and salt (see Section A.1.1 and HEA 1995 p25-6, MAFF 1995 p. 150 Τριχοπούλου, Λαΐου 1995).
- A large **variety** of foods and especially fruits and vegetables which are the only practical way to provide us with fibre and all the needed micronutrients in sufficient but not toxic quantities (see Sections A.1.1.4, A.1.2, MAFF 1995 p. 150 Τριχοπούλου Λαΐου 1995).

All nutrients have a special role to play in the body and none of them can be replaced by others. Additionally, some of them act synergistically e.g. vitamin D and calcium, and others are absorbed together like vitamin C and iron, poly-unsaturated fatty acids (PUFA) and vitamin E, fat and vitamin A, etc. To include all of them in our diet we have to take a great variety of foods. In some cases we need to take supplements, as in the case that for different reasons we abstain from a group of foods. For instance, if we abstain from animal foods we need to take supplements of vitamin B_{12}, which is found virtually in animal foods. But even supplements do not always safeguard the essential intake as the bioavailability of the different nutrients varies. It has been found, for instance, that vegans taking seaweeds as B_{12} supplement showed slow but consistent deterioration of this vitamin over a 2 year period (Rauma *et al.* 1995). Usually our body possesses homeostatic mechanisms that prevent the overdue concentration of micronutrients. However, this is not always the case. Some of these micronutrients such as vitamin B_3 do have toxic effects when taken at very high dosages. Copper, being an agent of immunocompetency, when taken in excess can act as a strong prooxidant, i.e., can facilitate oxidative processes, which are responsible for various types of cell damage. The same applies to vitamin C. The absorption of large quantities of some micronutrients acts antagonistically to other ones. As stated above, zinc may impair copper absorption and phytate iron absorption. Consequently we should avoid taking supplements of some nutrients expecting to maximize their beneficiary effects as this could have adverse effects. The implications for dietetics is clear:

> "Designing dietary measures with only one nutrient in mind does not explore the full potential of the intervention; it may even introduce the risk of marginal imbalances and deficiencies. These facts present the

> dietetics profession with the great and difficult challenge of translating nutrient recommendations into diets while recognizing and protecting the balance of their individual components." (Mertz 1994, p.1262)

The scientific edifice is based on the analytical method. We have reduced food into its constituent compounds, i.e. nutrients, because this has helped us to understand better how food works in us and we can more easily categorize the huge variety of food, in terms of composition and physiology. Understanding the concept of nutrients may also be helpful for literate people as a way of categorizing food and recognizing its physiologic properties. But this is as far as we can go with nutrients. We cannot design diet in terms of nutrients alone and we cannot perceive edible food as mere nutrients. All the more, we cannot deem certain nutrients as constituting a panacea and other as necessary evils. Such an approach could lead us to feed on the "good" nutrients alone and completely eliminate the "bad" ones, which would be disastrous. Imagine for instance that somebody decided absolutely to stop eating fat after the public demonology about fat that has been going on for several years now. Would that amount to taking her/his own life, while believing that s/he was protecting it? There is a pressing need to think for foods as well as nutrients when we talk about eating. This is the issue that will be addressed in the next Section.

1.4 Informing and educating the public

1.4.1 Varying objectives, two approaches

Informing and educating the public how to eat properly is not a simple task. Dietitians have to address a number of problems like the inconclusive evidence about the impact of certain foods on health, the translation of nutrients into food, the fluidity of the socioeconomic situation, the differences in cultural identity, cognitive levels and preferences among the various groups of the public etc. However difficult, the task has been tackled with some success. W.O. Atwater's imperative of **variety**, **proportionality** and **moderation** as a moto that must characterize public diet, has dominated the dietetics of the twentieth century (Welsh, 1994). However, the meaning of this triptych has not remained the same over the years. When it first appeared the emphasis was put on the adequate provision of energy. In the years of depression and later on in World War II, the emphasis shifted towards the provision of nutritious diets at low cost. In the 70s the findings of nutrition began pointing to the overconsumption of certain foods as being the cause of the rising incidences of cardiovascular disease among the population of the developed countries. Proportionality and moderation acquired a new timeliness, although the charter of good diet had to be redrawn in the light of these findings.

The values of nutrients given in Section 1.3 are estimates of the average requirements of the population (EARs), the reference nutrient intakes (RNIs) and the lower reference nutrient intakes (LRNIs). The meanings of the two last notions are that if somebody's intakes of a nutrient are above the RNI, then this intake is almost certainly sufficient and if somebody's intakes of a nutrient are below the LRNI, then this intake is almost certainly insufficient. So these values cannot be used as tight guidelines for adjusting the diets of the individuals. They are statistical concepts and as such they are useful for assessing dietary surveys and food supply statistics (HEA 1992b). However, one would expect with good reason that public health would improve if dietary habits reflected these values better than they do now. So how can this information be passed on to lay people and presented in a way that is comprehensible, persuasive and easily put into practice?

This is a job for the professionals (dietitians and trainers) according to HEA (1992b). The first suggestion is that some misunderstandings which are common among the professionals have to be corrected. These misunderstandings have to do with the distinction between saturated fatty acids and total fat, the distinction between milk-intrinsic sugars and additive sugar, the difference between dietary fibre and non starch polysaccharides, and the difference between salt and sodium intakes.

Stockley (1993) suggests that for nutrition education to be effective, it has (1) to be personally relevant, (2) understandable, (3) to take into account the consumers' perception of relative risks, (4) to use foods rather than nutrients and (5) to use consistent dietary messages. The fourth of those suggestions is one shared by many dietitians:

> "People eat food, not numbers. Educational advice for the general public should focus on balancing food choices, not computing grams and milligrams of nutrients" (Morreale & Schwartz, 1995, p.308).

Contento (1980), however, takes a critical position regarding the dilemma "foods or nutrients?". She points out that the "food specific approach" in nutrition education has two main disadvantages: first it makes some cultural assumptions not shared by everybody and secondly it can easily lead to the misunderstanding of the type "take one item from each group". On the other hand the "nutrient specific approach" is not unproblematic either. If education about nutrients is not thorough it will inevitably be value laden. For instance, recently there has been an emphasis on the role of fats and so the role of some other equally important nutrients is overlooked. The labels on food packaging showing the daily allowances for some nutrients may thus prove misleading as people will concentrate on those nutrients only and ignore other ones. For Contento (1980) the most important advantage of the nutrient approach is that it does not manipulate students' dietary choices.

From an educational point of view, the nutrients approach has the advantage of facilitating the process of learning. In Section 2.2.1 the views of two eminent theorists of learning are discussed, according to which, when knowledge undergoes a symbolization, it becomes easily retained and hence more usable. Nutrients can exactly play the role of symbols in the context of diet. Pupils that possess this symbolism may prove better and more easily educated on what constitutes a balanced diet.

Guthrie (1994) raises another issue:

> "Research shows that individuals eat more when presented with a varied diet... The challenge for nutrition educators is to provide guidance that accommodates innate sensory preferences as well as nutritional needs-guidance that strikes the balance between taste and health" (Guthrie 1994, p. 1814S)

1.4.2 Figures of healthy diet for the 90s: the pyramid and the plate

The concept of a schematic representation of healthy food is not a recent one. The current change of focus in nutrition though and the need for more effective spread of healthy diet messages, in line with the modern understanding of educational materials, gave birth to the 'Food guide pyramid' and the 'Balance of good health' or 'plate' (figures 2 and 3).

Compared with the guides of the past these guides are more comprehensive. In the past, guides like the 1946 "basic 7 food groups" [2] aimed at helping the public to include all the essential nutrients in their diet. The modern guides, though, include foods that are far from essential like sweets and soft drinks. The message of proportionality is also much more evident. Moderation and the avoidance of overnutrition is also a clear message in them. Variety is conveyed by the impressive number of foods portrayed in both guides.

The Food Guide Pyramid

KEY

IMAGE REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

[redacted]

Source: U. S. Department of Agriculture

Figure 2: The Food Guide Pyramid. Source: U. S. Department of Agriculture

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[2] The basic 7 food groups were: (1) leafy, green and yellow vegetables, (2) citrus fruit, tomatoes, raw cabbages, (3) potatoes and other vegetables and fruits, (4) milk, cheese ice cream, (5) meat, poultry, fish, eggs, dried peas, beans, (6) bread, flour cereals and (7) butter and fortified margarine (Welsh 1994).

The National Food Guide

The Balance of Good Health

IMAGE REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

[redacted]

Figure 3: The Balance of Good Health

The pyramid and the plate appear to be easy to use because they are memorable and straightforward to understand. They consist of only 6 and 5 sections respectively. These sections are obviously different in size and each one of them has a distinctive nutritional profile. The only differences in these two guides is that in the pyramid fruits and vegetables constitute different sections whereas in the plate they are put together. Vegetables contain more metals than fruits and this makes vegetables essential "in their own right". As for the configuration, the larger sections appear in the base of the pyramid but in the top of the pie-chart plate. Conversely sections of the least preferable foods appear in the top of the pyramid and in the lower part of the plate. This special feature of the pyramid may make the foods-to-be-avoided look superior or more essential to the other ones, which would give rise to serious misunderstandings. This risk was not supported though by the results of testing the pyramid among different population groups in the USA (Welsh 1994, p. 1807S).

The use of the pyramid as an educational material is examined by Achterberg and associates (1994). It is there suggested that the pyramid will be better understood and implemented if during several class periods each level-section is studied separately. Some emphasis must be given to the symbols of fats and sugars, which are "sprinkled" all over the pyramid. The frequency with which these symbols appear on the foods is indicative of the different contents of foods in terms of fats and sugars. One useful activity could be to "put the right food in the right section". This activity would be supposed to help students to recognize the nutritional profile of each food and to memorize the structure of the pyramid. Emphasis must be given also to the variability of the pyramid and to the recognition that ethnic foods also have a place in it.

In a document titled "Guidelines on Educational Materials concerned with Nutrition" by the Department of Health (1996) similar suggestions are put forward. The advice is that educational materials should recognize the variability of society (ethnic groups, people with special needs and of different ages etc). Nutrition education is advised to be in harmony with national health policy and to reflect current scientific thinking. Especially when on a certain issue agreement has not been reached among nutritionists, this should not be covered up and any preference for a certain view should be acknowledged.

One can easily come to the conclusion that schematic representations like the 'pyramid' and the 'plate' are not materials that have been produced for pamphlets capable of promoting a new understanding of healthy eating among the public by simple visualization. They should rather be considered as a basis for triggering a public dialogue, as materials that can be used in the classroom for active teaching and learning and as starting points that can evolve to various forms according to the needs, the culture and the preferences of the different groups of the population.

One attempt to adjust the "pyramid" to the situation of the Greek society was made by the Greek Ministry of Health and Welfare. It is titled "Mediterranean diet" and the amendments of the American lay out of the "pyramid" are the following:

The "Mediterranean pyramid" (figure 4) is divided in 3 main sections. The lower one, which covers the 78% of the total area, bears the label "every day" and comprises 6 sub-sections of differing areas. These subsections are starchy foods, green vegetables (the greater subsections), fruits, legumes and nuts, olive oil and olives and finally dairy foods. The middle section bears the label "few times per week", covers the 20% of the total area of the pyramid and is divided in four sub-sections. In diminishing order of area they are: fishes, poultry, eggs and sweets. Finally the tip of the pyramid (2% of the whole area) bears the label: "few times per month (or a little more often in small quantities)" and it figures red meat only. By the pyramid two other messages complete the picture. On the left the figure of a runner with the inscription: "systematic bodily exercise". On the right the figure of a glass with wine and underneath it the inscription: "moderate wine".

This pyramid is mainly based on surveys looking at the dietary habits of several areas around the Mediterranean sea during the 1960s and counting in epidemiological data from 1993. Those areas, namely Crete and South Italy, were selected because morbidity and mortality in them were among the lowest internationally (Τριχοπούλου και Λάγιου 1995). The percentage of fat in the Mediterranean type of diet varies significantly. In some areas like Crete total fat represents 40% of the energy intake whereas in Southern Italy the same percentage is 30%. Based on these facts Τριχοπούλου και Λάγιου (pp 56-60) argue that in areas where olive oil is the main fat consumed there is no reason for these high percentages to be lowered and that the percentages recommended by WHO (see Section A.1.1.3) can here be adjusted.

This version of the pyramid describes without any doubt a balanced and healthy diet. It also reflects the traditional diet of the Greeks, although in recent years this kind of diet is rapidly changing. However, it appears to have two major draw-backs. First (apart from fat intakes) it is unrealistically strict: No complacency with sweets (their area is less than 1% of the whole area) and no place for butter or spreads. Secondly it is not simple and memorable. There are 11 different groups on it in many different sizes which are not sorted in any memorable order. However the impact that this type of "pyramid" may have on people is not just a matter of speculation, but depends on the kind of use.

IMAGE REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

IMAGE REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Figure 4: The Mediterranean pyramid

1.4.3 Nutrition recommendations and public guidelines

The guidelines described above which are addressed to people of the so-called "affluent societies" are in harmony with the nutrition recommendations as they are described in Section 1.3. They convey the message of **variety** which is very important especially for the provision of all the essential micronutrients through the promotion of the idea of many sorts of foods. They also convey the message of **proportionality** which is especially important for the balanced intakes of macronutrients.

The meaning of **moderation** though is not very clear-cut. For some dietitians moderation means small amounts of fat and extrinsic sugars (Welsh 1994, p.1806S, Achterberg 1994, p.1031). But the author's view is that the need for reducing fatty and sugary foods is already tackled by the small areas of this type of foods in the "plate" and the "pyramid", i.e. by proportionality and that moderation as a basic imperative should address the **problem of overeating** generally. There is evidence that people tend to overeat when presented with a varied diet (J. Rodin via Guthrie, 1994, p.1814S). This, combined with the fact that variety in diet is both desirable and promoted, is a reason for advocating this latter meaning of moderation.

Another point where nutritionists and dietitians agree is the need to speak to people about **foods rather than nutrients**. It is, though, the case that a sound knowledge of the physiology of nutrients and the nutrient composition of foods can only act as a further incentive for improving one's dietary habits. So this point should not be understood as a strict directive but as a general rule that can be amended according to the audience. Besides, the structure of the "pyramid" and the "plate" imply a nutritive approach because each section has a distinctive nutrient profile.

The guidelines are flexible. This is a point stressed in several occasions in WHO (1990) (see citation in Section A.1.1.3). The slight differentiations that appear between documents 1 and 2 reflect this point and the fact that they were designed for different populations with different dietary habits and different socio-economic backgrounds. So small and gradual changes are seen as more effective by many nutritionists as well as by dietitians (Morreale *et al.* 1995, p.308), although they might not represent the ultimate goals of average intakes. The proponents of the

"Mediterranean pyramid" do not appear to agree with that last point and of course they will not be the only ones around.

1.5 The role of healthy diet in total health

After delving into the disciplines of nutrition and dietetics it is worth examining how the idea of health emerging from these disciplines compares to the synthetic definition of health given in Section 1.2.

First of all, health was there understood as having two aspects: the absence of disease and "wellness", i.e. the physical and mental well-being. Dietitians do care to reduce the incidence of common diet-related diseases be they the diseases of malnutrition or the diseases of overnutrition. Putting down ill-health, will, of course, have some beneficiary results on positive health. So one could suggest that dietitians do tackle both aspects of health, through the management of ill-health.

Physical and mental well-being, however, does not depend only on the absence of illnesses. It also depends on the balanced development of all the aspects of human existence, i.e. the bodily, the mental, the social, the environmental and the transcendental (Section 1.2.1). How do nutrition and dietetics contribute to this understanding of health?

By providing all the essential nutrients, the human **body** is helped to grow in its full potential and to develop fully its inherent defensive and homeostatic mechanisms. A balanced diet is also a very important protective factor against many chronic diseases. However, it must be admitted that nutrition is more preocccupied with ill-health than with the positive aspects of health although there is an important corpus of studies and literature concerning the dietary management of good health. Athletes for instance are advised to increase their intakes of vitamins C, E and α-carotene in order to stem the production of free radicals which are produced during vigorous exercise (Singh 1992) and to increase their carbohydrate intakes so as to maximize their glycogen stores before endurance events (deVries & Housh 1994). This type of research and the ensuing information is not widely disseminated although many people would be interested in it, people who are not necessarily sport professionals.

Full **mental** development is also well served by good nutrition. The dietary intervention in Guatemala which was cited in the introduction shows how important is the provision of the necessary quantities of protein for the mental development of humans. In Section A.1.2.2 also it is stated that iron and iodine are equally important for unhampered mental activity.

Eating and dietary habits are a part of **social** life. As some educational materials recognize "sharing food brings people together. Food may be the centre of a social event like a family gathering" (Science across Europe; What did you eat? 1993). People consolidate their friendships or their partnerships by having dinner or even a snack together. Dietary habits characterize nations and religions. Recognizing and respecting the important role that these rituals and habits play in our social lives is a health-promoting act. In Section 1.4.3 it was shown that nutrition recommendations can flexibly take into account the socio-economic situation in each country or geographical area. In our days more and more health-promoting interventions recognize the important role of food and eating for social life. This of course does not mean that traditional or ethnic dietary habits have to be deemed as unapproachable taboos by dietitians. It means that these habits must not be ignored or dealt with with contempt and in addition that dietary recommendations have to be adapted to these habits as far as it is possible. This was one of the points made in the "Guidelines on Educational Materials concerned with Nutrition" by the Department of Health (Section 1.4.2) where it was stated that "educational materials have to recognize the variability of society (ethnic groups, people with special needs and of different ages etc)". So, it is mainly a task for dietitians and food policy makers to relate nutritional imperatives to the different cultures and economies in order to present the public with diet patterns that are affordable and pleasant to live with, and it appears that today this task is increasingly understood.

For humans to be healthy they have to be in balance with their **physical environment**. How does today's nutrition and dietetics help humans to adapt better to their environment? Better adaptation can be achieved in two ways: first by sparingly use of the natural resources and secondly by reducing and properly managing the wastes from food production, be they chemicals used in cultivations, used packaging or whatever.

The eating pattern described in Section 1.3.2 and portrayed in the "pyramid" and the "plate" (Section 1.4.2) by recommending considerably greater consumption (and hence production) of plant foods compared to animal ones does serve the purpose of the economic use of natural resources. Mayer (1987) stresses that:

> "as food energy moves from one trophic level to another, only somewhere between 10 to 20% is available to produce the organisms of the next higher trophic level. Ten thousand pounds of grain will produce a thousand pounds of cattle, which in turn, can only produce a hundred pounds of juman beings. Thus the lower the trophic level on which organisms exist, the more efficient is their energy utilization." (Mayer 1987, p. 35)

Waste from agriculture and the food industry, however, are far too many today. Molecular biology may in the future provide a solution for using less pesticides and other chemicals by producing crops that are more resistant to illnesses. On the other hand we have to address the problem of packaging materials which for the time being are still all-too-often difficult to recycle and not degradable.

Some of the problems related to the environmental consequences of food production can obviously be tackled by scientists only. Some other problems, however, ask for the sensitisation and activation of the public. Dietetics for the time being seems to contribute only marginally to this as explained in the penultimate paragraph. The key for the involvement of the public in this debate, however, is nutrition education. Nutrition educators should not be preoccupied with explaining the impact of food on bodily health only. The public has to be informed about the impact that production, processing, preservation and packaging of food have on the environment. In addition some universal indicators should be introduced for the labelling of food so as to convey relative information. Some of those indicators could be the quantity of water needed for the production of one unit of mass of a certain food, or the energy required for the recycling of a certain item packaging etc.

The **transcendental** is the part of human existence which according to its proponents is "the totality of psychological factors and their interrelationships for which the classical concept of 'mind' is inadequate; the invisible area of life which transcends scientific enquiry, but which plays a vital role in the context of health" (Schaefer 1987a, p.17). This part of human existence is characterized by

individuality and **internality** which are two principles that according to the same author characterize positive health.

There is a great danger for dietitians to perceive people's nutrition education as an exercise for conformity. It is the nature of traditional science to draw general conclusions from where there is variety. Consequently, disciplines like dietetics which are based on science are inclined to render this generality as a general pattern which must be mimicked by everybody. But generality and conformity should not be the only ways to make sense of people and their needs:

> "People have two possible ways of observing themselves: the scientific method... and the method of introspection, leading to disciplines like philosophy, the arts, the humanities. The latter disciplines make statements about feelings, perceptions, deliberations, sensations. All these are not objects of science as they can only be experienced personally." (Schaefer 1987b, p. 24)

Recommendations that oppose or ignore these principles are not conducive to healthy living. Do dietary recommendations take into account the fact that any group of population consists of individuals? Do they allow for variation or is it the case that individuals are seen just as mass society?

The author's view is that the more precise and concrete dietary recommendations are, the more likely it is that there is left no room for people's individuality and that recommendations that are only expressed in terms of foods easily fall in this category. For this reason in the vocabulary of dietary recommendations and guidelines there must be achieved a kind of **balance between foods and nutrients** so that there is left enough room for individuals to decide what sort of foods matches better their values, preferences, style of life and esthetics. This is the conclusion that Contento (1980) drew as well saying that in order to avoid making cultural assumptions manipulating people's habits, we must not speak in terms of foods only (see Section 1.4.1).

If nutrition education is to shed its tendency to manipulate peoples' dietary habits and to take on the task of helping individuals make their own healthy decisions it has to become preoccupied with each person's special needs and perspectives rather than with applying strict guidelines for everybody:

> "In my experience with students from primary school to university, in Brazil and the United States, self-centered courses are those which motivate students best and nutrition is the more frequently chosen topic whenever students have a choice" (Raw 1987, p. 86).

At the end of the day one has to reply to the question: "Are nutrition and dietetics concerned with and do they contribute to the overall health of humans?". Any monolithic answer to this question would be an unacceptable generalisation. Answers can only be given with reference to certain cases of the promotion of healthy eating. Such campaigns, courses and interventions are the work of dietitians and health educators and not of nutritionists and they are finally responsible for the fashioning of the healthy-diet-models.

But as current nutrition is **more preoccupied with the avoidance of diseases and less with the promotion of well-being** it is possible that these patterns may gradually acquire an overall negative profile of the type: "avoid this and that for they are bad for you". Such models of diet are not conducive to health, because people who might foster them might also cut down on the variety of foods and lose the joy of eating. So any campaign of healthy diet has to have **the positive and the negative element** in it. Diet and related activities like shopping, cooking and eating with others can contribute to enjoyment, entertainment, invigoration, immunity and socialization. On the other hand, excesses with food and drinking can also lead to degenerative diseases, addiction, feelings of impotence, low self esteem and social seclusion. A good campaign has to address both these aspects, positive and negative, from causes, i.e. specific eating habits, to effects, i.e. the outcomes of these habits.

Health is not simply a matter of the "ego", it depends on the social and environmental situation. On the other hand the needs of each individual differ from those of others. That means that any campaign or course about healthy diet has to strike a balance in stressing what is good for the population and the environment and at the same time the natural right of each human to differ in the way that s/he perceives and puts into practice healthy diet.

1.6 Nutrition and formal education

1.6.1 Nutrition in the Greek secondary curriculum

Since this research looks at ideas about diet and health maintained by young people who have completed their general secondary education, it is worth examining how the subject of healthy eating is tackled at that education level in the countries where this research was carried out. This is going to be an overview of the directives given on this subject by the educational authorities of Greece and Britain. A more detailed report on the health policies of all eleven schools used in the research would not be desirable as the comparisons will be between students of different countries and not of different schools.

The syllabus for Greek secondary schools is structured in distinct subjects. The topics to be studied in each subject are mainly determined by the official textbooks distributed to the students at the start of each school year. Teachers are expected to cover a good deal of the content of each book during the school year and for this reason they have to report the progressive covering of each text book at the end of each teaching period. This puts considerable strain on the teachers who in most cases end up in teaching only the topics included in the textbooks. The objectives for each subject as well as some ideas for teaching strategies are included in special editions from the Ministry of Education that are distributed at the start of each school year to the teachers.

Nutrition education does not constitute a distinct subject in the Greek secondary syllabus. However, many topics having to do with food and nutrition are included in other subjects. These subjects are: Biology/Anthropology and Home Economics. Home Economics is the subject in which nutrition is a major component but this is an optional subject, seldom included in schools' timetables. A great number of Greek students were not taught Home Economics at the time that this study was conducted.

One of the three objectives set by the Ministry of Education for Biology/Anthropology is:

> "(for the students) to understand and be able to cope with everyday biological problems and phenomena regarding the humans as

organisms and as members of society (hygiene of the body and the society)" (Translation from Παιδαγωγικό Ινστιτούτο 1995, p.44)

In this subject, 12-13 year old students are taught human anatomy in the course of 20 periods of 45 minutes each. Two of these periods are dedicated to the study of the digestive system. The parts of the course titled "Hygiene of nutrition and of the digestive system" and "Vitamins" which are included in the formal textbook (Αργύρης & Κάβουρας 1995 pp 42-45) are suggested by the Ministry of Education to be taught in one period.

The information given in this text, which does not exceed the one thousand words, is of the following nature:

1. The necessary daily intakes of nutrients and their energy content.
2. In which foods are the different nutrients found in.
3. Guidelines for the prevention of dental caries, constipation, undernourishment, obesity, cardiovascular diseases, diabetes and common vitamin deficiencies.

This is the basic instruction about nutrition that all Greek students are expected to have during their secondary education. In addition schools are free to organize discussions or updating meetings on health-related issues and it is most likely that students will have participated in one or two such events during their secondary studies.

1.6.2 Nutrition in the British secondary curriculum

The National Curriculum for England and Wales (Department for Education 1995b) mandates the subjects and the contents within each subject that have to be taught in all primary and secondary schools in those areas of the United Kingdom. Health is a sub-subject within science education that is met in all four stages of schooling. The importance of nutrition for health, though, is an issue that is mainly dealt within secondary education, i.e. at key stages (KS) 3 and 4[3]. The 'outright' nutritional issues that are prescribed in the Section named "Life Processes and Living Things" are:

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[3]Key stage 3 is for 11-14 year old students, year groups 7-9 and key stage 4 is for 14-16 year old students or year groups 10-11.

1. The nutrients, their food-sources and their role in energy provision, growth and tissue repair (KS3).
2. Digestion and digestive system (KS3 & KS4).

Issues that can be associated with dietary habits but without any mention of such association being made are:

1. The impact of science on health, quality of life and the environment (KS3 & KS4).
2. Circulation and blood (KS3 & KS4).
3. Respiration (KS3 & KS4).
4. Immunisation (KS3 & KS4).
5. The flow of mass and energy in food chains and ecological considerations (KS3 & KS4).
6. Health and safety in relation to unfamiliar activities and environments (KS4).
7. Hormones (KS4).
8. The nature of scientific ideas (KS4).

The frame set in the National Curriculum for including food-related issues in science lessons is very broad and flexible but in some cases might lead to important omissions too. The role of food, for instance, is unilaterally described because there is no mention for the possible harmful consequences of food. There is also no clue for the role that food can play in boosting the defence system of the body and the food is conspicuously missing in the health and safety issue.

A more integrated approach to health education is portrayed in a document titled: "5. Health Education" which was produced by the National Curriculum Council (1990). This is an advisory document and, unlike the National Curriculum, its guidelines are not expected to be accomplished in every school. There is a different perspective in this advisory document compared to the National Curriculum, because in it, it is recognized that health education is an issue that cannot be restricted in the classroom only or in the frame of one subject and at the same time that there is need for coordination within each school so that health education is not "diluted" amongst the different school activities:

> " (health education) is one of the cross-curricular themes ... not an additional subject. Many elements of health education can be taught through the subjects of the National Curriculum and other timetabled

provision, in addition to being promoted through the wider aspects of school life" (National Curriculum Council 1990, p.1).

In order to prevent the disintegration of health education among the different subjects it is recommended that in each school there should be introduced a policy of management and coordination which would "minimize repetition and help provide coherent health education" (ibid p.3).

For food and nutrition, which is defined as one of the nine components of health education, it is recommended that the following specific ideas and topics should be tackled. These topics, in order of ascending key stages, are:

1. Awareness of the variety of foods and of the cultural and personal needs that determine their choice.
2. Growth and good health are based on proper food.
3. Diet consists of foods and food consists of nutrients.
4. The qualitative and quantitative composition of food contributes to health.
5. Handling of food and the role of additives.
6. Health depends on a varying diet.
7. Specific relationships between diet and good-/ ill-health.
8. Microbiology and food technology.
9. Analysis and evaluation of diet in a background of social, cultural and financial situations.
10. Different healthy diets for different cultures.
11. Food legislation and food labelling.
12. Food, body-image and self-esteem.
13. Sources of knowledge in dietary matters (NCC 1990, p.12-20).

It appears that the propounders of this 'elective syllabus' were concerned about the following main issues:

1. Physiology of foods based on their nutrient content: topics 2, 3, 4, 6, 7 & 10.
2. Sociology of food: 1, 9 & 10.
3. Nutrition-related practical and mental skills: 1, 4, 5, 6, 7, 8, 11 & 13.
4. Diet for the individual: 1, 10 &12.

1.6.3 Comments on nutrition education in schools

A possible comparison between the Greek and the British approaches to the issue of nutrition education would normally take into account the basic topics that have to be taught in all schools in relation to this issue. This means that the "comparable quantities" are the nutrition guidelines in the Greek textbook of Anthropology and the nutritional and nutrition-related issues prescribed in "Science in the National Curriculum" from the British side.

What is common in those two approaches is the need for teaching about the composition of food. As for the physiology of food in the Greek text book (Section 1.6.1) that is very concrete, but almost entirely limited to the adverse effects of unbalanced diet only. In the British National Curriculum physiology might be broader as it refers to the positive aspects of food and at the same time introduces topics where the adverse effects of unbalanced diet can be tackled. This tackling is left to the discretion of the teacher though. So none of these basic approaches can be recommended as both broad and well defined at the same time.

These Greek text books however and the British National Curriculum may not be enough to reveal the different perspectives in the two educational systems: It seems that the Greek educational system, especially as far as scientific lessons are concerned, is more preoccupied with what is described as "hard science". One example will clarify this point better. In the guidelines about the teaching of the digestive system (which is expected to be completed in 90 minutes) it is suggested that the following experiments are carried out: splitting of starch with amylase and tracing the produced glucose with Fehling's solution; coagulation of milk with rennet; reactions of proteins with alcohol, hydrochloric acid, nitric acid, sodium hydroxide and heat. It is obvious that the emphasis here is more on chemical-biological reactions than with the physiology of foods. In addition, most of the theoretical underpinning for these reactions is not known to the students and will not be taught to them in the course of the secondary education. These activities do not relate easily to the information given to the students about the physiology of foods and what and how we should eat. There is a gap between them which can only be explained if the policy is: keep students busy with rudimentary science and tell them what to do with everyday life.

On the other hand, nutrition education in British secondary schools might be more integrated if a health education policy is deployed according to the recommendations given in "5. Health Education", discussed in Section 1.6.2. This potential nutrition education excels the likely Greek understanding about nutrition education in a number of ways: It is more explanatory and clarifies why and how people should take care of their diet; at the same time it is less prescriptive and allows for freedom of choice for individuals. A healthy diet is related to social and psychological (self-esteem) issues, whereas in the Greek syllabus health is identified with physical health. Finally the (potential) British approach recognizes that some technological knowledge is also needed for choosing the right foods because food processing, preservation and handling affects its properties.

As for the scheduling of the syllabus, the British one takes place over more years of schooling, which means that British students will have considerably more opportunities to reflect, revise and develop attitudes on this matter compared to their Greek counterparts. However, the periodic revisiting of the issue of healthy eating in the course of secondary education might also mean that, depending on the circumstances of the instruction and the ability of the students, some of them will not be able to integrate and interconnect all the information. But, overall, the policy of revisiting and getting progressively deeper and wider insights of important issues in the course of education can only result in better learning outcomes compared to the policy of "at one go" which is followed in Greek schools.

All these advantages that nutrition education in British schools has over nutrition education in Greek schools depend on the willingness of British teachers to make health education a priority in school activities and on the degree of their commitment.

Nutrition education in British and Greek syllabuses reflects to some extent the health model discussed in Sections 1.2 to 1.5, namely the bodily, the environmental and the social dimensions of health. The British syllabus does so to a greater extent. However both these syllabuses lack certain points, particularly those which would advocate that good diet contributes to overall well being:

1. **The effects of good diet on the positive aspect of physical health are not fully covered.** For instance there is no reference to the ways in which proper diet can help in developing the full potential in athletic performance. Many young people are

nowadays concerned with sports. Reference to the positive bearings of diet on performance would make the issue more relevant to them and more attractive which in turn would facilitate the learning process. There is also no reference on how proper eating makes somebody feel well. For instance, why should people be left alone to discover which foods are more capable of filling them when they can be instructed that when some nutrients are combined in moderate quantities, e.g. proteins with starch, foods may offer long lasting saturation?

2. **The psycho-mental effects of diet are only partly covered.** There is no reference to the joy of eating especially when combined with the freedom of making choices. The more prescribed is food and eating, the more unlikely it is for a person to draw enjoyment from it. This danger is more visible in the Greek syllabus. There is also no mention that for the full mental development of people an adequate and balanced diet is needed (see Section 1.5). This might be very important information for those young people who consciously or otherwise downgrade their physical health in pursuing optimal mental fitness.

3. **There is no reference to the effects that our eating patterns have on the physical environment.** As mentioned in Section 1.5 the production of animal food compared to plant foods consumes considerably greater amounts of natural resources. At a time when the overpopulation of the planet is already prominent to the point of global food shortage, students should start introducing the environmental parameter in their food choices.

4. Finally, but perhaps most importantly, **there is a lot of discussion about attributes of health but not about health per se**. Survival, immunization, development of the individual, risks, bodily function, illnesses and socialization are all issues relative to health. But health, as discussed in Section 1.2.1, can be understood as the synthesis of many parts and as the attainment of a balance between those parts. Are students helped to develop a comprehensive and coherent model about health? If they are not, then there is a great danger that many of them will be preoccupied with the trees and ignore the forest. Such trees may be the manias for weight-loss, for muscle-building, for excessive athletic performance, hypochondria etc.

So both the British and the Greek approaches in secondary education are not broad enough to introduce all the issues related to healthy eating. However, there is no reason for those issues missing from the curricula not to be introduced in the classroom or as a school policy. To what extent teachers agree that nutrition education should address all these issues is a matter worth exploring.

Chapter 2: NUTRITION AND SOCIAL PSYCHOLOGICAL THEORIES

2.1 Introduction

Chapter 1 dealt with three main questions:

- Why to teach nutrition,
- What to teach about nutrition and
- How to teach nutrition.

These three questions are of prime importance for any nutrition educator, who having found convincing answers, can feel that his/her efforts are sanctioned by good reason and so can set out to proliferate health-enhancing habits in society.

But what about the other part of this communication? How do youngsters and lay people in general accept information regarding health-related habits, how do they perceive the relevant messages and how probable is it that their lifestyles will be affected from what they learn? Answers to questions like these are of equal importance for nutrition educators. The content and the method of their teaching will have to be properly adapted so as to make their messages sensible and acceptable to their audiences, relevant to their needs and fitting with their lifestyles.

This Chapter deals exactly with the questions of the previous paragraph. The usual mechanism of disseminating health-related habits proposed from many researchers of this area is the sequence Knowledge → Attitudes → Behaviour: People are expected to be informed, to formulate positive attitudes about a certain behaviour and to modify their habits accordingly. So in two articles attempting a meta-analysis of the existing literature on nutrition education we read:

> "Nutrition education research is applied behavioral science, and therefore should include what is known about nutrition-related human conduct (i.e. knowledge, attitudes, and behavior)." (Smith & Lopez 1991, p. 59)
>
> "... about three-fourths of the studies in Journal of Nutrition Education

are still based on implicit assumptions or models (usually the knowledge-attitude-behavior or K-A-B model)..." (Achterberg & Clark 1992, p. 231).

In this Chapter the main theories that logically sustain and elaborate the Knowledge - Attitudes - Behaviour mechanism are reviewed. These theories are relevant to nutrition education as they have been applied in several projects dealing with people's ideas and practices on matters of healthy eating.

Many theories have attempted to describe, predict and explain the way that people react to messages about healthy eating. Smith & Lopez (1991, p. 60) categorize these theories in three major groups: (1) The **Cognitive theories** which assume that people are rational and that all they need is good information and freedom of choice in order to adopt healthy habits, (2) the **Social-Psychological theories** which deal with the attempts of people to harmonize their beliefs and their behaviours within a frame of interpersonal relations and amidst a diverse social habitat and (3) the **Behavioural theories** which postulate that peoples' behaviour is a mere product of the environment in which they live.

The main difference in these three theoretical approaches lies on the ability of the individual to control his/her actions. From the perspective of cognitive theories people are bound to take positive action once they are properly informed. This ability is denied by the behavioural theories: since the environment and the circumstances are responsible for our behaviour we are not free to act according to our will, if such a thing exists. The stance of social-psychological theories lies in the midway. People try to put into practice what they believe to be good for them but this is not always easy as the environment in which they live in affects their attempts.

Behavioural theories are frequently at odds with educational objectives. According to Krathwohl and associates (1956, pp 30,33) the objective of education should be internalization rather than compliance. Compliance is seen as the acceptance of the influence by a person in order to receive some reward and this is the routine approach in behavioural educational theory. On the other hand, internalization of a behaviour happens when an individual at the initial stage recognizes the possible influences that s/he accepts and at a more advanced stage s/he accepts the values incorporated in this behaviour. In fact if humans' acts were characterized by simple compliance, i.e. if behavioural theories were a completely adequate description of human behaviour, then there would be no need for an education that prepares people to make choices. It would be of no use as people would act always and fully under the influence of factors beyond their control.

On the other hand, to accept that peoples' choices, especially where dietary habits are concerned, is something determined solely by reason and free choice is not very realistic. First of all, the same variety of food is not available to everybody either because of market restrictions or because of expense, which means that the environment is, anyway, one of the factors determining eating habits. Secondly, people are influenced by their societal status as the literature that will be reviewed in the following pages suggests.

It follows then that the only realistic theoretical approach is the one enshrined in **Social-Psychological theories (SPTs)**. Putting forward a more representational argument, Social-Psychological theories fit better the model of health factors presented in Section 1.2.2, as they recognize the personal and the environmental factors that influence peoples' health, whereas Cognitive theories rely more heavily on personal factors and Behavioural theories on environmental ones.

The most commonly applied Social-Psychological theories in nutrition education and interventions are: (1) Social Cognitive theory (SCT), (2) Diffusion of Innovations theory (DOIT), (3) Health Belief Model (HBM) and (4) Theory of Reasoned Action (TORA). Guthrie (1994) believes that these theories have focused on understanding attitudes and beliefs related to diet and health. Exactly the same theories are referred by Baranowski (1992) as dealing with behavioural change in eating practice. The deployment of these theories for dealing with knowledge and attitudes as well as behaviour reveals that they have a really wide scope through which we can interpret human actions.

Many researchers have expressed the hope for a kind of integration of these or any other theories which have been used in the context of nutrition education:

> "No one theory is sufficient: food choices reflect a combination of environmental, social, personal and biological factors" (Glanz & Rudd 1993).
>
> "...future efforts in nutrition education research and programming should make a concerted effort to synthesize and combine theories in order to generate a framework that can successfully guide the many

> dimensions of designing an effective nutrition education program or intervention." (Achterberg & Clark 1992).

Glanz and Rudd (1993) have also found that these theories are considered as important for explaining food choice by nutrition educators and consumer behaviour professionals.

2.2 Brief presentation of theories

2.2.1 Social cognitive theory (SCT)

The new element that Alfred Bandura, the propounder of SCT, introduced in the learning theories of his times (the 1960s) was that learning is something that happens without imitation being necessarily involved (Hergenhahn 1993). For him the process of learning is primarily a cognitive one, which involves human thought and judgement in contrast to the theories of behaviour which basically treated humans as (supposedly) kinds of animals who learn only through trial and error. The meanings of reinforcement and punishment which according to the preceding theories are, deliberately or not, applied to the learning subject, appear in SCT in a broader mode: Subjects mainly observe others bearing the consequences of their acts, they register this information and they process it in a way that is advantageous to them. So people learn through vicarious reinforcement and punishment, though the possibility of learning through personal experience is not ruled out. But the mass of information resulting from observing others is much greater compared with that coming out of personal experience.

Bandura does not assert that the learning ensuing the observation of the same thing(s) is identical for everybody. On the contrary, learning depends on four processes which differ among people:

- **The attentional processes**: Different people pay attention to different aspects of the same event, although:

  > "People pay attention to models reputed to be effective and ignore those who, by appearance or reputation, are presumed to be ineffectual..." (Bandura via Hergenhahn p.327)

- **The retentional processes**: In order for some information to be stored in somebody's memory, it has to be transcribed into symbols. These symbols may be images, words (verbal symbolization) or some other.

- **The behavioural production processes**: Humans rehearse some of the behaviours observed on others and use the image of that same behaviour performed by the model and stored in their memory to compare it with and improve it.
- **The motivational processes**: Actions that result in reinforcement or avoidance of punishment are more likely to be stored in memory than other actions.

We have seen in Section 1.4.1 that for the information to be usable it has to be stored in memory. But this storing has to undergo a kind of symbolization, and the most powerful symbolization of behaviour for Bandura is the verbal one. This is not a novel idea. Douglas Barnes (1976) argues that:

> The importance of language - and other symbolic systems such as mathematics - is that it makes knowledge and thought processes readily available to introspection and revision. If we know what we know, then we can change it (Ibid p.19).

Bandura's answer to the tantalizing question of whether human beings are free to **act** or whether it is circumstances and the environment that determine their behaviour is not as monolithic as the question suggests. Bandura maintains that there is a reciprocal interaction between these three notions. The person, their environment and their actions are in a constant interplay. None of them would be considered invariable and each one can be affected by the other two. This model is called **reciprocal determinism**.

By drawing a line between person and his/her actions, i.e. by not considering person and actions having a whole-to-part relation, Bandura indicates that there is a certain degree of independence between the two. But of what kind may this interplay between the person and his/her actions be? The person can produce, defend, criticize, withhold, modify, study and condemn his/her actions. Those actions on the other hand may affect in various ways their perpetrator. They can harm, benefit and teach him/her. This means that there is a dynamic relation between the person and the actions, there is evolution. Both of them may change. This idea has already been tackled in behavioural production processes where it was stated that a kind of dialogue is set up between the image of the model in the learner's mind and the performance of a given behaviour by this same learner. But this whole process does not take place in a vacuum as it is affected by the environmental variables and it affects the environment to a certain degree.

To the original question i.e. whether or not humans are free to act, Bandura gives a quantitative reply: They are free to some extent as their actions are regulated by them but this regulation is limited by their abilities of learning and performing and by the limits set by the environment.

For Bandura there are no such things as universal standards. Each one creates his/her own performance standards in the way that has been described in the two previous paragraphs. When these standards are set they become the personal measure by which behaviour is self-evaluated. These standards are characterized by their (relative) level and the value that the individual puts on them. Both (the level and the value) are crucial for the behavioural outcome. Referring to the level of the standards, Bandura reflects:

> "In its more extreme forms, harsh standards for self-evaluation give rise to depressive reactions, chronic discouragement, feelings of worthlessness and lack of purposefulness" (Bandura 1977, p.141)

and

> "Subgoals of moderate difficulty are therefore likely to be most motivating and satisfying" (ibid 162)

The setting of those standards is not an arbitrary process. It depends on the perceived self-efficacy of the person, in other words how well the person believes he/she is able to perform a given task. But the actual good performance according to those standards depends on the relative position of the perceived self-efficacy to the real self-efficacy. If the perceived self-efficacy is well above the real one, then the most likely outcome is for this person in reality not to perform according to his/her standards. This whole mechanism is a very internal one which can to some extent be influenced by external factors. Bandura believes that intrinsic reinforcement is much more effective than extrinsic.

But how can intrinsic reinforcement for a specific behaviour be produced? It is when a certain person values the expectations from this behaviour. This is called an expectancy and it is one of the most powerful reinforcements.

2.2.2 Diffusion of Innovations Theory (DOIT) and Stages of Change (SOC)

The theory called Diffusion of innovations (DOIT from now on) propounded by Everett Rogers (Rogers 1983) deals with the mechanism through which this innovation is or is not adopted by individuals and with the rates that a certain innovation spreads in a community.

The **mechanism** consists of five stages. The first stage is that of **knowledge**. One has to be aware of that innovation before considering its potential use. Incoming of knowledge is not absolutely random. Usually we are predisposed to accept some messages and ignore others (selective exposure). Moreover we tend to interpret the incoming information in a way that complements our existing attitudes on the specific area (selective perception). So we are not quite open to listen to and comprehend all the information that comes to us. Our needs usually predispose us to listen to some innovations. But the opposite process is also possible. Some innovations may create needs that we had not realized before. So:

> "Innovations can lead to needs and vice versa" (Rogers p. 166)

The knowledge associated with an innovation is of two types. The knowledge of the proper use of innovation (how-to-knowledge) and the knowledge about the way that the innovation works (principles knowledge). According to Rogers the on-site propagators of an innovation are mainly dealing with the how-to-knowledge. The understanding of the innovation or principles knowledge is rather seen as a matter of general education or formal schooling. Moreover:

> "When such understanding is lacking, the change agent's long-run task remains very difficult" (ibid p. 168)

Then comes the **persuasion** stage. Now the individual becomes involved in the idea. The former stage was a mainly cognitive process, but this is an affective one. Thus DOIT comes very close to the rationale of the Taxonomy of Educational Objectives. For this latter theory the first two steps of the cognitive continuum are 'knowledge' and 'comprehension', and the first two steps in the affective continuum are the 'receiving of stimuli' and 'responding to them'. There is an analogy between the transition from knowledge to persuasion of DOIT and the transition from knowledge to comprehension of the Taxonomy of Educational Objectives:

> "There is a relation, however, for certainly attending to a phenomenon is prerequisite to knowing about it. Further, only as one is willing to attend to a phenomenon will he learn about it" (Krathwohl *et al.* 1956 p.50).

Another parallel can be drawn between the notion of principles knowledge in the DOIT and that of comprehension in the Taxonomy of Educational Objectives, although these are seen happening in different stages. Rogers suggests that principles knowledge must be there for an innovation to be easily grasped. For the authors of the Taxonomy of Educational Objectives, though, the phenomenon should be presented first and its explanation is something that follows. And indeed this is the practice followed in schools. In the social environment, though, the sequence proposed by DOIT looks more plausible. For all their similarities, we should bear in mind that the nature of the DOIT is mainly descriptive while that of Taxonomy of Educational Objectives is prescriptive.

DOIT resembles SCT in describing the way that an individual develops a (favourable or unfavourable) attitude towards the innovation:

> "... an individual may mentally apply the new idea to his or her present or anticipated future situation before deciding whether or not to try it. This is a kind of vicarious trial. The ability to think hypothetically and counter-factually and to project into the future is an important mental capacity at the persuasion stage..." (Rogers p. 170)

As we have seen in Section 2.2.1 Bandura proposes exactly the same mechanism of learning, i.e. vicarious reinforcement and punishment.

The third stage is that of **decision**. The individual either adopts or rejects the innovation. Which innovations are more likely to be adopted? The crucial attributes for the adoption of an innovation, according to research evidence are the following:

- The relative advantage: How much better does the new idea look?
- Compatibility: Is it compatible with existing values, experiences and needs of the adopters?
- (Non-)Complexity: Is it easy to grasp and use?
- Trialability: How much 'try and see' is it?
- Observability: Are the results of the innovation visible to others?

Then comes the **implementation** stage. Rogers points out that deciding to put the innovation into practice is one thing and the way that the innovation will be put into practice is another. Quite a lot of people actually 're-invent' the innovation when they put it into practice, i.e.

> "the innovation is changed or modified by the user in the process of its adoption and implementation" (ibid p. 176)

Some innovations are more susceptible to re-invention than others. Those that are complex or not well grasped are more likely to be re-invented but re-inventions are not necessarily bad.

Finally in the **confirmation** stage the individual tries to make sure that the initial decision about using or not using the innovation was rightly made.

A version of this mechanism of stages proposed in DOIT is the **Transtheoretical Model of Stages of Change** (SOC) (Prochaska *et al.* 1992, 1994). According to this model any behavioural change is a process consisting of five stages:

- precontemplation (no knowledge of, or no intention to change);
- contemplation (thinking about change);
- preparation of decision (planning the change);
- action (changing behaviour, or intervening on the factors that affect it);
- maintenance of the acquired behaviour.

DOIT and SOC support the notion that change in behaviour follows certain distinct stages, which are almost identical in these two approaches. So the first stage of knowledge in DOIT can be paralleled to contemplation, which is the second stage in SOC, persuasion and decision (2nd and 3rd stages in DOIT) to preparation (3rd stage in SOC), implementation (4th stage in DOIT) to action (4th stage in SOC) and finally, confirmation (5th stage in DOIT) is almost identical to maintenance (5th stage in SOC). However, the two perspectives are distinct. Their differences can be deduced by the names given to the stages. In DOIT the stages are named with regard to the internal functions (mainly cognitive and affective) that determine the final behavioural outcome, whereas in SOC the names of three of the stages refer to the behaviour itself. Nomenclature apart, DOIT attempts a more psychological interpretation of behavioural change by elaborating on each stage, and explaining the potential outcomes of each stage.

As for the **rate of adoption** of an innovation, Rogers (DOIT), based on previous research, came up with the S-shaped diffusion curve. This figure, which represents the rate of diffusion in a community over time, tells us that in the initial stages innovation spreads slowly with time (low gradient), then the rate of adoption increases (high gradient) and finally adoption decelerates again when it reaches its satiety point (low gradient). The first 2.5% of the adopters are the innovators, usually venturesome people. The next 13.5% approximately are the early adopters, usually the social leaders. Then comes the early majority which represents 34% of the total adopters. These are people who weigh possible benefits and costs before acting. The next 34% are the late majority, believed to be of a lower socio-economic status, who are usually influenced in their decisions by their peers. The last to join the innovation are the laggards, people characterized by their adherence to tradition and by social seclusion.

2.2.3 Health Belief Model (HBM)

The Health Belief Model (HBM), both in its initial form and as evolved later, is a product of collaborative work. This model deals with the psychology of the individual who develops an attitude about allegedly preventive practice against a disease.

There are two main points in this model: the first one is about the positioning of the individual with regard to the disease and the second one is the positioning against the preventive practice (Rosenstock 1974). An individual may think that s/he is or is not **susceptible** to a certain disease and that this disease is or is not serious, i.e. its occurrence may have **serious** or not so serious consequences for her/his life, vitality etc.. If the individual thinks that s/he is susceptible to this disease which if occurs will be a severe disease then this person develops a **readiness to act** against the occurrence of this disease. In a few words, perceived susceptibility to and severity of an illness usually makes somebody ready to act against it.

The way that somebody decides about taking an action against the disease is the following. First a preventive action has to be thought of as effective. Secondly the cost of the specific action is weighed: how much time, money or effort is it going to claim, does it require giving up well-established habits? It is finally the weighing of the benefits of this practice against the costs that its possible adoption would entail that give the final answer. If the benefits expected from this preventive action are valued more than the costs it will claim then the individual is expected to get involved in it. The perceived effects and costs or barriers of the action are often collectively named as **modifying variables**.

But is this psychological drama merely a matter of thoughts, perceptions and calculations? Not always. Sometimes an event can precipitate the making of the decision about whether or not to take the action. This event can be a message through the media, a reminder by a health professional, the sickening of a relative etc.. Such an event is called a **cue to action**, which “activates the readiness variables, and serves to make the individual consciously aware of his feelings” (Maiman and Becker 1974). For a cue to action to be effective it has to be relatively intense: the lower the readiness of an individual the more intense the cue to action has to be in order to instigate this individual to take action.

The creators of the HBM acknowledged that the model had a “clear-cut avoidance orientation” (Rosenstock p.333). It mainly deals with what are seen as negative aspect of health, i.e. diseases. This is because this model was developed in a certain historical context: a group of investigators in the USA Health Service were called to deal with the widespread phenomenon of the failure of people to accept disease preventives or screening tests for the detection of asymptomatic diseases such as tuberculosis or cervical cancer. Another characteristic of the model is its incorporation of personal beliefs as opposed to commonly accepted grounds. Even the physical environment has a role to play only to the extent that it is represented in the mind of the behaving individual (ibid p.329).

In its first form the HBM did not take into account the different attitudes held towards health by different people. One of its first expansions was the addition of a separate motivational variable representing the general willingness of the individual to achieve a high level of health, the **‘general health motivation’** (Maiman and Becker 1974, p. 349). Some people are more health conscious than other. Those people will be more inclined to follow preventive action. So the modifying variables are not just perceived efficacy (positive) and barriers (negative) but also the general predisposition of the individual towards matters of health, which can be low or high but is in most cases positive.

Associated with the general health motivation of a person is the perceived **Health Locus of Control** (HLC). According to this model people identify the control over their health with external or/and internal factors. When this locus tends to be external, that is when people believe that their health is determined by factors like fate rather than their own lifestyles, then these people are categorized as external HLC. On the other hand people who believe that their health is determined more by their habits, like avoiding smoking, exercising or having regular check-ups, and less by factors independent from their will and actions are called internal HLC people.

This new variable appeared to be very productive in predicting peoples' habits. Seeman and Seeman (1983) in a longitudinal survey which involved one thousand people and examined a number of health indices found out that internal HLC is positively associated with: (1) practising preventive health measures, e.g. diet, exercise, alcohol moderation, avoiding smoking; (2) higher health indices like fewer episodes of illness and fewer bed-days and (3) appear more optimistic about early medical treatment of cancer. These findings were based absolutely on self-reports. The authors admitted that:

> "The causal sequence is difficult to disentangle, since the sense of control can be a product of one's health experience, as well as a determinant of it" (Seeman and Seeman 1983, p. 155).

Although the problem of whether it is the case that an internal HLC creates positive practices or it happens the other way round remained unsolved, R. Lau attempted to pinpoint the origins of HLC in childhood by asking 250 undergraduates to fill in a questionnaire containing 20 standardized questions dealing with HLC and with the subject's early health habits and sickness experiences. He found out that practising a variety of health habits as a child was associated with beliefs in the controllability of health (=internal HLC) and that experiences with sickness in one's family had even more pervasive effects, since many such experiences led to beliefs that health is not controllable (Lau 1982, p. 331).

If we accept that in childhood people do have not clear-cut ideas about matters like the controllability of health, this last survey may point us in the right direction in giving us some clues about the sequence of causality between habits and HLC. The positive correlations between early experiences and the development of HLC might then represent a causal relationship: early healthy habits result in the development of internal HLC and early experiencing of fatalities and sickness result in the development of external HLC. Far from saying that the matter is then determined we can turn to Bandura's reciprocal determinism to arrive at a model of how things evolve thereafter: experience and beliefs advance hand in hand during adulthood, i.e. there is a reciprocal effect between them.

2.2.4 Theory of reasoned Action (TORA)

I. Aijzen and M. Fishbein developed the theory of Reasoned Action (TORA) which holds that human behaviour is very closely associated with human **intention** with regard to the specific behaviour. So their theory focuses on the factors that formulate intention. These are the **attitude** toward the behaviour and the **subjective norm**. When someone believes that a behaviour leads to certain outcomes and that these outcomes are valued, then s/he will develop a positive attitude towards this behaviour. The subjective norm, on the other hand, depends on two beliefs of social nature: the person estimates that some other persons would like to see him/her performing this behaviour, so s/he will develop a positive subjective norm to the extent that s/he wishes to comply to their wishes.

To what degree is intention affected by those two factors? It depends on the individual. For some individuals attitudes are a more decisive factor than subjective norm, for some others it is the other way round and for a third kind of people these two factors are balanced. This theory is summed up in the equation:

$$B \sim BI = [Aact]w_0 + [NB(Mc)]w_1$$

where B = overt behaviour; BI = behavioural intention; Aact = attitude toward the action; NB = normative belief; Mc = motivation to comply with the normative belief; and w_0 and w_1 are empirically determined weights (Ajzen & Fishbein 1973).

The same authors analyze the behaviour in four elements: the action, the target, the context (the venue where this action takes place) and the time, and argue that:

"A person's attitude has a consistently strong relation with his or her

> behavior when it is directed at the same target and when it involves the same action." (Ajzen and Fishbein 1977 p. 912).

As an instance from the field of healthy diet, let us consider as target the avoidance of CVD. Those people who are concerned about their cardiac health (the target) and have positive attitudes about low-fat diet (action) are very likely to eat accordingly. In the case of healthy diet, the context and the time as elements of the behaviour are not important.

A more recent advancement of this theory is the addition of a third factor that can affect the intention of a person undertaking a specific behaviour. This factor is the Perceived Behaviour Control, which is:

> "representing one's perception of how easy or difficult it is to perform the behaviour." (Aarts *et al.* 1997, p. 364)

This factor is almost identical to the "perceived self efficacy" notion proposed in SCT (Section 2.2.1). So it is very interesting and promising to see the major theories in this field converging in certain points.

TORA is a mainly cognitive theory because intention is the main field of concern. It does not deal with any sort of practicalities at all. Its main strength lies in the fact that it allows for as many types of individuals as the shifting across the axis from strongly attitudinal to strongly normative permits. So the variation of behaviour between different people is seen as the product of different beliefs and values that different people have about physiology and human relations.

2.3 Application of social psychological theories in nutrition

The Social Psychological Theories have been used in nutrition surveys and interventions for two distinct purposes:

- to confirm and elaborate on the proposals of the theories;
- to deploy these theories for planning interventions.

There follows a review of some of the articles elicited in the leading English language journals of health that refer to nutrition and have made use of the Social Psychological theories in the last 15 years. This review is structured according to the purpose of the use of the theories.

2.3.1 Surveys based on Social Psychological Theories

2.3.1.1 Testing the plausibility of Social Cognitive Theory

In a longitudinal survey (Shannon *et al.* 1990) it was examined how key concepts of the **Social Cognitive Theory** predict eating behaviour. This eating **behaviour** aimed at weight loss and was analyzed as moderation of Calorie intake and moderation of fat intake. The factors that, according to the hypothesized model, affected the eating behaviour were **environmental social factors** represented by family and peer support, **self efficacy**, analyzed as perceived ability to choose the right foods and ability to avoid overeating, and **outcome expectancy**. The subjects (initially 170 women) participated in a 10 week weight control course, while their attitudes and practices were recorded prior to the course, immediately after it and two months later.

It was found that initial self efficacy in choosing the right foods was positively correlated with eating behaviour while at the final stage of the survey self efficacy in the ability to avoid overeating was positively correlated with changes in eating behaviour. Prior eating behaviour was also positively correlated with changes in eating behaviour. Generally friends and family support were also positively correlated with self efficacy variables, while outcome expectancy was not associated with eating habits or a change in them.

These findings do add credence to the concept of perceived self-efficacy of a person as a predictor of performing a desirable behaviour. However the authors' contention that "the contribution of outcome expectancy on change behaviour was inconsistent and weak" masks the fact that the outcome expectancy had been very high among the participants throughout the course. With possible range from 1 (=not confident) to 6 (=confident), the mean value for outcome expectancy was 5.23 before the intervention and remained exactly the same after it. Although the authors did not manage to correlate the change in outcome expectancy to a change in the eating behaviour, the role of outcome expectancy in the whole process has been unfairly underestimated. If the participants were not very confident that the typical eating practice would have certain desirable results, they surely would not have been involved in this time- and effort-consuming experiment.

Another point that has to be questioned is the interpretation of the statistics. The authors hypothesized a model according to which self-efficacy, for instance, affects eating behaviour. The extraction of a positive and statistical significant coefficient between the variables that measured these two concepts was arbitrarily interpreted as "self efficacy influences eating behaviour". Statistical parameters do not reveal causative relationships. I.e., we cannot conclude that self efficacy influenced eating behaviour or that eating behaviour influenced self efficacy. According to SCT and reciprocal determinism, behaviour affects the person and the person's attributes affect his/her behaviour. Therefore, the set up of one-way causative models by the authors is theoretically flawed and constitutes misinterpretation of the data.

The split of self-efficacy into two distinct components wisely renders the fact that our eating habits are determined by our ability to perform in the cognitive, affective and psychomotive domains. Selecting the foods that contain a nutrient in a wanted concentration demands certain cognitive skills, whereas controlling the amount of intake of this food demands skills that pertain to the affective and psychomotive domains.

Domel and associates (1993 and 1995) in two articles present the findings of a major survey conducted among 4th and 5th grade primary school pupils in Georgia, USA. This survey was also tailored on the concepts proposed in Social Cognitive theory. In the first stage the authors talked to focus groups of pupils, their parents and teachers, in order to assess the environmental issues and children's ideas and skills that may influence fruit and vegetable consumption. The findings of this first stage formed the basis for the development of the tools of the main research which was carried out through questionnaires and sought to reveal the expectancies of the children concerning fruit and vegetable consumption (Domel *et al.* 1995). These expectancies were then related to the actual consumption. Principal components analyses of the pupils expectancies revealed two main subscales which were categorized as social reward and expectancies of improving health and physical ability. It was also found that the children had higher expectations that fruit and vegetable would make them healthier, bigger and stronger than that they would make them more physically attractive and popular. Another major finding was that outcome expectations were poorly related to consumption and slightly more strongly to preferences.

It is an interesting finding that regarding a balanced diet children maintain stronger expectancies about the promotion of health compared to social reward, a datum which lends credence to the contention of SCT that intrinsic reinforcement is stronger than extrinsic. However, intrinsic reinforcement at that age does not seem to ensure dietary modification.

2.3.1.2. About stages of change and attributes of innovation

It appears that during the 1990s the **Transtheoretical Model of Stages of Change** (SOC) has engaged many researchers and inspired several projects. In fact, researchers in the domain of Nutrition have always sought for an integration of the most popular theories (see Section 2.1). So, the potential of an allegedly 'Transtheoretical model' has had many chances to be vigorously tested.

The existence of the stages has engaged all the researchers that have in any way encompassed SOC in their surveys. A combination of two tools has been used for the classification of the participants in stages of change. One was a straightforward question about the stage in which a person believes that he/she is in. The other tool is to derive the stage from answers to food frequency questionnaires.

Researchers have faced different problems in determining the stages of people. One problem was that for several persons each tool of inquiry pointed to a different stage of change, i.e. some people believed that they were in one stage, whereas their diets revealed that they were in another stage. Usually people believed that they were in a more advanced stage of change than the one that they really were (Lechner *et al.* 1998). Another problem was the clear demarcation of the stages. The propounders of the model set a limit of six months for distinguishing between action and maintenance. In one survey, though, 82% of the sample said that they had been trying to eat healthily for more than 6 months (Povey *et al.* 1999). In the same survey it was found that the less precisely the behaviour was described, the greater the percentage of people that believed that they were in an advanced stage of change. So, 85% of the people believed that they were in action or maintenance stages regarding "healthy eating", but only 41% were trying or had managed to eat five portions of fruit and vegetables per day.

The difficulty of classifying people into stages has led to many researchers combining certain stages. So in one case pre-contemplation, contemplation and preparation were united and the model was transformed into three stages of change (Kristal *et al.* 2000). In another case contemplation and preparation formed the second stage and action and maintenance formed the third stage of the three-stage model (Kramish Campbell *et al.* 1999). And finally, in another survey, precontemplation was united with contemplation and action with maintenance (Sorensen *et al.* 1998).

Normally, the existence of stages of change should be verified by longitudinal surveys. By simply asking people whether, for instance, they are in the course of trying to eat healthily it does not necessarily mean that those who answer affirmatively were, in a previous stage, not trying and at a later stage will either adopt this habit for good, or will relapse to non-healthy eating habits. People may attempt to eat in a certain way for all their lives and never manage it. "Resolutions to change behaviours do not always result in actual behaviour modification" (Sorensen *et al.* 1998, p. 599). In the unique survey of Kristal *et al.* (2000) the above requirement for longitudinal tracking was fulfilled. One year after the baseline survey and after the running of an intervention aiming at reducing fat intake and increasing fibre intake 60% of the sample remained at the stage in which they were initially classified.

These problems with the stages of change model may stem from the fact that this model was initially devised for the cessation of addictive habits (smoking, drug use etc). As some researchers admit (Glanz *et al.* 1994, Povey *et al.* 1999), healthy eating is quite another thing; it is a general behaviour, not a clear target like the cessation of a concrete habit. Healthy eating cannot in fact be patterned (see Section 1.5), which makes the empirical confirmation of stages of change a rather unattainable task and their existence doubtful. As Alfred Bandura notes:

> "Human functioning is simply too multifaceted and multidetermined to be categorized into a few discrete stages" (through Povey *et al.* 1999, p.649).

If the stages of change are not obvious in the case of Nutrition, then: "... the implication ... is that dietary interventions should emphasize continued dietary change and behaviour goal attainment regardless of stage" (Kristal *et al.* 2000 p.123).

Mutatis mutandis, what is said about the Transtheoretical model of Stages of Change can be said about the stages included in the theory of **Diffusion of Innovations**. However, as we have seen in Section 2.2.2, this theory postulates that for an innovation to be accepted it has to be advantageous, compatible, simple, easily tested and with obvious results. The importance of these attributes with regard to healthy eating was tested by Terry and associates. The researchers of this survey (Terry *et al.* 1991) explored whether there exists any association between the adoption of a diet that reduces the likelihood of heart disease and the perception that this diet possesses the attributes of advantage, compatibility, non-complexity, trialability and observability. Three hundred male people, who had not been diagnosed for heart disease and/or diabetes, were interviewed over the phone with a questionnaire that included food frequency questions (dependent variable) and questions about the perceived attributes of the heart disease preventing diet.

It was found that the adoption of a protective diet was significantly related to positive perceptions about all five attributes of this type of diet. In particular, compatibility, trialability and observability were more strongly related to adoption of the said food behaviour than were advantage and non-complexity.

Undoubtedly, these findings lend support to the validity of those attributes that according to DOIT predict adoption of an innovation. However, it must be admitted that although most of the statements of the questionnaire are very properly chosen to investigate a certain attribute, some might pertain to more than one attribute and certain others are hardly recognized as measures of the attribute for which they are chosen[1].

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[1] For instance in which attribute could we categorize the statement:

> "Most high-fat foods taste too good to give up?"

This statement may well measure the relative (dis-)advantage of low fat diet, as in fact is believed by the authors, but may also measure the compatibility of this behaviour with existing practices of the individual. In addition, it may also measure the complexity of the innovation. Complexity according to Rogers

> "is the degree to which an innovation is perceived as relatively difficult to understand and to use" (Rogers p. 238)

and to switch from a palatable diet to a less palatable one, as the statement implies, is certainly a difficult thing to do, hence the innovation difficult to use.
Or the statement:

> "if I change the amount of fat that I eat, I would expect to see a change in my blood cholesterol level"

which for the researchers measures the observability of the innovation, could rather measure

2.3.1.3 Testing the Health Belief Model and Theory of Reasoned Action

Two surveys conducted in the USA attempted to investigate the success of **Health Belief Model** in explaining people's dietary habits. Their methods were similar. People were asked their attitudes relative to health and their replies were related to their self-reported eating habits. Control variables like gender, level of education and professional status were also considered.

In the more recent of those two surveys (Dittus *et al.* 1995) the following were selected as attitude variables:

- nutrition concern;
- perceived susceptibility to cancer;
- knowledge about the benefits of fruit and vegetable intake;
- barriers to fruit and vegetable consumption.

These were the independent variables. The dependent variable was worked out from the frequency of consumption of fruits and vegetables high in pro-vitamin A, vitamin C and fibre which are believed to be cancer preventing. As hypothesized, it was found that nutrition concern, susceptibility to cancer and knowledge about the benefits of fruit and vegetable intake were all positively correlated to nutrition behaviour, whereas barriers to fruit and vegetable consumption were negatively correlated to nutrition behaviour and perceived benefits of intake.

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the relative advantage of it. For Rogers

> "observability is the degree to which the results of an innovation are visible to others" (Rogers p.240)

But this statement asks whether the individual believes that a low fat diet may reduce the risk of heart disease or not. This ambiguity about the attribute to which each statement corresponds may be due to the different perspective of the researchers but it might also mean that the attributes themselves have to be redefined or reworded. The scope of the attribute of relative advantage, for instance, is too wide and certainly overlaps with the other attributes. If, for instance, a certain recommended food is relished by an individual then this food is in an **advantageous** position compared to other foods, it is better to eat, but it also shows a **compatibility** with the individual's palate and moreover it is easier to try it, hence it excels in **trialability**. This overlapping could be reduced if the above mentioned attributes were for diet purposes redefined as follows:

Relative advantage: The degree to which a recommended type of diet or food is perceived by the individual to increase a physiological function or to reduce the probability of developing a disease.

Compatibility: The degree to which a recommended type of diet or food is deemed as tasty for the individual and is not in dissonance with his/her morals or sensitivities.

Trialability: How inexpensive, easy to find in the market and easy to process a recommended type of diet or food is.

In an older survey dealing with HBM (Hayes *et al.* 1987) the following were selected as independent variables:

- concern with appearance;
- the health locus of control;
- concern with health.

The dependent variable was a variable combining the self-reported healthiness of diet and the concern about healthy eating. The results were controlled for income, education, gender and marital status. It was found that it was the combination of concern with health with internal health locus of control that made people eat health consciously. It was also found that concern with appearance was per se positively correlated with healthy eating habits, and that concern with appearance appeared more motivating that concern with health in the selection of eating habits.

These two surveys tell us different, but not contradictory things. The method of the first of them (Dittus *et al.* 1995) encompasses a greater part of the HBM, and its variables fit more easily with the concepts put forward by this model. So, nutrition concern, health concern, as a component of general health motivation (see Section 2.2.3), and barriers to fruit and vegetable consumption can easily be characterized as modifying variables for the specific behaviour, whereas susceptibility to cancer is one component determining the readiness to act. The second component determining readiness to act, i.e. the perceived severity of cancer was not examined, probably because it was thought of as obvious. However, the treatment of these four variables as absolutely independent ones does not do full justice to the HBM. According to it, the combination of readiness to act (susceptibility to and severity of illness) with positive modifying variables outweighing negative ones may result in adopting this action. But the combination of readiness to act with modifying variables was not examined in this survey.

One finding in the same survey that must not pass unremarked is that barriers of fruit and vegetable intake were negatively correlated with perceived benefits from the same intake. Pure logic argues that believing in the beneficial effect of an action is independent of whether one can or cannot perform this action. This finding is an indication that beliefs that should normally be the outcome of information alone via a cognitive mechanism are also influenced by practicality. This finding casts a shadow on the independence of reason from other domains of human performances, and hence the priority of beliefs over behaviour, which HBM and TORA postulate.

The other survey (Hayes *et al.* 1987), albeit more elliptical in the deployment of HBM, succeeds in revealing its limits. Two of the independent variables, health concern and HLC, are motivational variables, while no variable was devised for exploring the readiness to act. This survey suggests that health concern and HLC do not appear to act independently, but in conjunction. It is only when people believe that they have mastery over their health that their concern about health finds expression in healthy eating. Concern with appearance is not a motivational variable according to HBM. It cannot be classified as a social norm about healthy eating, since social norms about appearance are not always health promoting. Some eating disorders, like anorexia nervosa, stem from the obsession of people with their looks. This finding suggests that peoples' healthy eating habits are sometimes induced by reasons that have nothing to do with health. And this is something not foreseen in HBM, at least at its initial form[2].

Although neither of these surveys asserts a conclusive corroboration of HBM, much less its refutation, both seem to suggest that this model is more reason laden than it should be when applied in nutrition.

Saunders and Rahilly (1990) applied the **theory of Reasoned Action** to examine the factors that influence intentions to reduce intakes of fat and sugar among 86 university health and non-health majors. They developed a questionnaire which in addition to request for demographic information included six groups of questions that dealt with moderation in fat and sugar intakes. Specifically, these questions looked at: (1) what the individuals believed about the outcomes of this behaviour (2) how they valued these outcomes, (3) whether the individuals believed that important others, like their partner of parents, would approve of this behaviour, (4) how the respondents valued this possible approval, (5) intention to reduce fat and sugar intakes in the next two weeks and (6) current dietary habits concerning fat and sugar intakes. The first two groups of questions measured the attitudinal component of the diet and the next two the normative component, according to TORA (Section 2.2.4).

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[2]Becker et al (1977) recognize that "the original Model has a disease-avoidance orientation; yet, it is likely that positive health motivations exist, and also, that individuals often engage in actions having health implications but for reasons unrelated to health" (p.349).

The first four groups were treated as independent variables and the last two as dependent ones.

For the whole sample it was found that the intention to adopt this type of diet was strongly related to both the attitudes and subjective norm. However, the attitudinal component was found to be much stronger predictor of intention than the social normative component for the health majors whereas the social influences were slightly more important than the attitudinal component among the non-health majors. This seems to imply that people better informed on health matters are more likely to be influenced by their own knowledge in developing intentions that favour good habits. For people not very well informed, social influences seem to count more.

Another important finding is that those people that reported that they already restricted their fat and sugar intakes also reported that 'important others' would approve their behaviour to a much higher degree compared to those who did not have such a diet. However, 'restricters' and 'non-restricters' did not differ significantly on the motivation to comply with the wishes of other people.

These findings suggest that TORA has been vindicated by many aspects in this survey. What has not been proved though, as in so many other cases in the literature, is the causal relationship between attitudes and social influences on the one part and intention to act accordingly on the other. Another possible shortcoming of this research is that the sample was not random as the participants were selected among college students who at one time or another had attended health courses, something admitted by the authors. But the final conclusion is that:

> "The Ajzen and Fishbein model can be used to identify possible differences in other populations" (Saunders & Rahilly 1990, p.175).

Differences between populations is an issue also tackled by DOIT. In Section 2.3.1 we have seen that the first half of the population to adopt an innovation share the characteristics of knowledge and purposeful action whereas the people who are late to adopt the innovation are more likely to be influenced by social conventions. Very close to those two characteristics are the attitudes toward the behaviour and the subjective norm respectively which are put forward by TORA. The findings of the survey discussed here supports the fact that early adopters are mainly influenced by their knowledge and beliefs. The authors report that the diet restricters had developed significantly more positive attitudes toward the specific diet compared to those who did not cut down on fat and sugar. So, this research lends credit not only to TORA but to an interesting part of DOIT as well.

Theory of Planned Behaviour, which is a revised version of TORA, was the subject of a questionnaire survey which involved 527 Norwegians aged between 23 and 26 years (Oygard *et al.* 1996). As mentioned in Section 2.2.4, the latest version of TORA includes three factors that affect intention to perform a behaviour: attitudes towards this behaviour, subjective norm and perceived behavioural control. The researchers found that attitudes proved the strongest predictor of intention "to eat healthier food during the next 4 weeks". The second strongest predictor was the perceived behavioural control, while subjective norm was the weakest predictor of the three.

2.3.1.4 The validity of the Social Psychological Theories

According to the above cited research, the main concepts proposed by the Social Psychological theories that statistically predict eating habits are:

1. **Health concern** combined with **internal Health Locus of Control**. This concept is met in the revised HBM.
2. The **belief** that a certain eating profile brings about **valued outcomes**. This concept is met in all the theories under different names. In SCT it is called intrinsic expectancy, in DOIT relative advantage, and in TORA attitude towards the behaviour.
3. The **willingness to comply** with social pressure regarding dietary habits. This factor is called subjective norm by TORA. In SCT this concept can be classified in environmental impact and is called extrinsic expectancy.
4. The **confidence** that the individual **knows how** to eat healthily and is able to **persist** in this type of diet. This concept is named self efficacy in SCT and perceived behaviour control in the theory of planned behaviour, the successor of TORA.
5. Feelings about **susceptibility** in a **severe** illness, combined with the belief that a certain type of diet can eliminate the risk of this illness (concept 2, above). These feelings result in readiness to act according to HBM.
6. **Easy practising** of the diet. This easiness is analyzed as compatibility,

trialability and observability in DOIT. HBM refers to them collectively as modifying variables.

7. Concerns, which at first sight have nothing to do with health, may also have an impact on the way that somebody diets. One such concern is about **appearance.**

The demonstration of the importance of the above-mentioned concepts for eating behaviour, no doubt provides support for the theories from which these concepts have arisen. However, it must be admitted that **none of these theories has been tested as a whole.**

The closest attempt to such testing has been to investigate the existence of stages of dietary change (DOIT and SOC). In fact this has been investigated repeatedly and the studies have provided rather negative results.

The rest of the theories that propose models consisting of causatively related notions culminating in the (non-)adoption of the behaviour, i.e. HBM and TORA, have not been appropriately tested. Testing these models includes testing the causality of the relationships. But all the research in the literature look only at the extent to which these notions relate correlationally. In statistics choosing one of two variables as independent and the other as dependent can be quite an arbitrary process and the finding of a significant correlation coefficient does not necessarily mean that the concept expressed by the dependent variable has been produced by the concept represented by the independent variable. A causative relationship between these variables could possibly be established through qualitative research or through research based on longitudinal interventions, but such research is not the norm.

The proposed by SCT **reciprocal determinism** continuous and dialectic interaction between person, behaviour and environment, implies that behaviour should not be seen as the final act of a psycho-social drama. Behaviour can be influenced by social, economic, environmental or psychological factors but can also influence them. For this reason SCT is the most flexible and hence the most widely applicable among these theories in explaining people's behaviour. In fact, although reciprocal determinism has repeatedly guided interventions, its validity has seldom been questioned. This is presumably either because its logic is seen as indisputable or because it can hardly been refuted by means of social research.

The writer's conviction is that reciprocal determinism is a (no doubt general) model that can account for the establishment of health-related behaviours. Eating behaviour consists of **many actions** (2.3.1.2), each of which is formed **progressively as a habit**. For an action to be established as habit, intention and positive reinforcement from the performance of this action are both necessary. It doesn't matter which one comes first, the intention or the performance. Both are prerequisites of equal importance and each of them has an impact on the other. For instance, a positive intention to cut down on sweets may lead someone to start experimenting by reducing the number of sweets they eat. If however, this experiment creates strong feelings of deprivation, the initial positive intention may change to a negative one. The difference with the other examined theories is that they put, e.g., the barrier of negative feelings in front of the enactment, as a thought. But barriers are not always thought of in advance. Often barriers appear as feedback from the enactment of the behaviour. The same can be said about positive reinforcement.

A deeper understanding of reciprocal determinism could have saved many researchers from many pains attempting to explain human behaviour as a one-way process from volition through conditions to actions.

2.3.2 The Social Psychological Theories in Nutrition Programmes

2.3.2.1 Explicit application of the Social Psychological theories

An intervention aiming at increasing fruit and vegetable consumption took place in Georgia and involved 10-11 year-old youngsters. In the relevant article (Domel *et al.* 1993) we are informed that this intervention was based on **reciprocal determinism** and for this reason it was designed "to impact the environment, affect and skills of students" (ibid p. 346). The programme included a wide range of activities like: recipe preparation, taste-testing, games, role-playing, sending newsletter to the parents and a 'Fruits & Vegetables festival'. There was also some kind of teaching for which we are not given any other information. A number of behavioural change techniques were also followed like goal-setting, self-monitoring and problem solving. The whole programme lasted roughly two months and it took the class-time of health education. So, with regard to the triptych of person-environment-behaviour, this programme acted on the first two in an attempt to affect the third, i.e. to precipitate favourable dietary modification.

The outcomes of this intervention were assessed as the measured differences of (1) fruit and vegetable consumption, (2) knowledge and (3) fruit and vegetable preferences, before and immediately after the completion of the programme, among the pupils of the experimental school and in another school where the programme was not deployed (control school).

It was found that although the pupils' knowledge in the experimental school improved significantly after the intervention, compared to that of the pupils in the control school, the changes in preferences and consumption were negligible. The researchers conclude that:

> "More intensive efforts are needed to change practices outside of school (e.g. in the home), where dietary behaviors are more under the control of parents." (Domel *et al.* p. 348).

Another intervention tailored on **SCT** was applied in Home Economics classes at the 7th year at four junior high schools in Bergen, Norway (Klepp *et al.* 1993). The objective of the intervention was to increase consumption of fresh fruits, vegetables, whole-wheat bread and low-fat dairy products, and to reduce consumption of high-sugar and high-fat snack foods among the participants.

The intervention addressed four factors: availability of food products, social environment, personality factors and behavioural factors. It was suggested that in addition to knowledge, students should be able to analyze and understand how their environment influences their own food choices and how students can influence their own environment. Students were also trained to select and prepare healthy foods, to resist social pressure to have an unbalanced diet and were encouraged to communicate with their parents about food. The implementation of the programme's activities was assigned to peer leaders who were appropriately trained. These activities were carried out in small groups.

Students were asked to complete three series of three day food records prior to, immediately after and seven months after the completion of the programme. The data from the questionnaires completed by the students who attended the programme were compared to similar data collected from students of two other schools of the same grade who attended a conventional lesson of Home Economics. It was found that the females that participated reported healthier food choices in both follow-up surveys. For male participants a positive effect of the intervention on their eating habits was recorded in the first follow up survey only. As for the knowledge outcome of the intervention, both male and female participants in the programme performed better than their control peers in the first and the second "examination" after the intervention.

Another intervention aiming at improving eating habits (decreasing fat and increasing fibre consumption) of energy workers was undertaken at different worksites in 11 Southern states of USA (Glanz *et al.* 1993a). For the planning of this intervention elements of four theories were deployed: **Consumer Information Processing, SOC, SCT and DOIT**. Among the selected tactics were:

- information was oriented to eating guidelines rather than reasoning and explaining why;
- information was individualized according to the stage of change that every participant was believed to be in;
- small group meetings were organized and educational materials were given aiming at improving self-control and self-efficacy;
- small presents were given as incentives for the participation in informational programmes;
- at each worksite location a site coordinator was named and an Employee Advisory Board was selected on the base of their effectiveness as opinion leaders. Their duty was to adjust the different activities of the intervention to the conditions of the given worksite.

Another important attribute of the intervention was that it was planned to last for 30 months. The outcomes of this intervention were not traced in the literature.

The **HBM** has been applied in an intervention aiming at instructing mothers with obese children how to feed their children in order for them to lose weight (Becker *et al.* 1977). The sample, which included 200 mothers, was divided into three groups. The first group was used as a control group. The second group received a 'high fear' message about the consequences of obesity and the third group received a 'low fear' message for the same subject. The mothers of all three groups were interviewed about their beliefs on health and obesity. The changes in children's weight over a two month period and the mothers' long term clinic appointment-keeping were used as dependent variables.

Mothers' worries about their children's susceptibility to and severity of diseases, both conducive to readiness to act according to HBM, proved to be good predictors of weight loss and appointment keeping in the clinic. The results of the intervention were that the 'high fear' group had the most consistent long-term effects on cumulative weight losses, the 'low fear' group showed lower losses and the control group did not present any significant weight losses. The authors sum up that:

> "Perceptions related to health motives, to threat (i.e., to susceptibility and severity, whether general or weight-specific), and to benefits of and barriers to the diet, show positive relationships to weight loss..." (ibid p. 360).

The results of this intervention have their own value, which is not the usefulness of HBM in nutrition interventions in general, but more the usefulness of HBM in interventions aiming at guiding mothers how to improve their children's body-mass index. Seen under this perspective it is not surprising that mothers' readiness to act was better increased by high fear than by low fear messages. Mothers' affection and sense of responsibility for their children was the soft spot that was targeted by the fear messages. However, it should not be taken for granted that people have the same feelings of responsibility for their own health. On the contrary, too many people are engaged in behaviours like inappropriate drug use, unprotected sex, smoking and reckless driving, recognizing the health risk that such behaviours entail.

2.3.2.2 Implicit application of the Social Psychological Theories

A number of nutritional programmes have made use of the concepts and postulates of the theories examined above without explicitly referring to them. Such programmes are all too often applied in schools. An overview may help us better to identify the potential of SPTs in nutrition.

In a concise programme applied in primary schools in UK (Seaman *et al.* 1995) it was hypothesized that "combining the marketing expertise found in the food industry with knowledge of nutrition and education is more likely to result in a successful campaign". This campaign aimed at promoting a positive health image for foods high in starch among pupils. The message that was disseminated through a talk plus quiz was that decreasing fat consumption and increasing starch consumption will improve long-term health. This was followed by a swimming session ran by a member of the Olympic swimming team and a rice-based meal (including sauces), prepared on school premises. In this programme we have the combination of actual and vicarious (through successful models) learning of the behaviour, as **SCT** theorizes.

The **evaluation** showed that in the following month pupils cut down significantly on chips and fried potatoes and increased their intakes of complex carbohydrates.

In another ambitious programme applied in primary schools in the UK the challenge of school nutrition education was perceived as "not only of educating pupils to make more healthy choices but also to ensure that food availability throughout the school day encourages them to exercise these choices" (Bowker *et al.* 1998, p. 136). The pivotal concept of this programme is that of **barriers**, a concept met in more than one SPT, combined with making healthy eating **easy**.

Possible barriers that discourage pupils from having wholesome breakfasts, snacks or meals were identified and practical solutions for overcoming them were suggested. For instance, missing breakfast due to lack of time or money at home was met by organizing breakfast in school. Pupils were also encouraged to run tuck shops, thus linking nutrition education with maths. Other interventions included collaboration with catering services so as to increase variety in nutritious foods, sessions with parents in order to avoid unbalanced food at home, decoration of the school dining room and opening school to health services of the community.

Collaboration with pupils, a principal features of the programme, was not always fruitful. When in a school pupils were asked what foods they would like to be sold in the canteen they named foods that they actually did not consume. Obviously these pupils named foods thought of as 'healthy', which they actually did not prefer to eat.

It is an exaggeration to seek the results of programmes like this in the long-term eating habits of the pupils. The positive thing is to make the healthy choice in school the easy choice and it seems that this has been achieved in many cases.

A 3-year programme aiming at increasing fruit and vegetable consumption among secondary school students involved 6 intervention and 6 control schools (Nicklas *et al.* 1998). This programme, like the previous one, was built on the dipole **barriers - easy practising** while the rise of self-efficacy was among its aims.

Barriers to fruit and vegetable consumption were identified through discussions with focus groups. These were lack of availability, lack of variety and inconsistency in taste. Attempts to surmount these barriers were provided through the following interventions: A **media marketing campaign** (monthly promotions, taste testings, student contests with activities promoting peer leadership and student interaction), **workshops** (five 55 minutes workshops with a variety of learning strategies), **Supplementary subject activities** (f&v issues in the academic courses), **school meal modification** (increase in the availability, variety and taste of f&v in the school cafeterias), **parent involvement** (mainly information through tips, recipes etc).

The **evaluation** of the programme revealed that the treatment group showed significantly better **knowledge** scores in the last two (surveys) compared to the control group. The treatment group showed statistically significant increased intakes of f&v in the first and second year surveys, but in the next year's survey, the intakes were even (possible effect of the national "5-a-day for Better Health campaign"). The increase in **self-efficacy** was linear from 1994 (inception of the programme) to 1997 (end of it) for both groups.

An information-oriented programme that involved lower secondary school students in Scotland lasted for 18 months and had limited success (Wrieden *et al.* 1998). Among the small amount of non-information dissemination teaching there were activities where students from the University of Dundee, expected to act as **models**, worked with pupils preparing eating plans and a healthy recipe book.

Closing this review, a special mention must be made for the international movement of the **Health Promoting School** (HPM). The rationale behind this movement is that because low health indices usually coincide with low socio-economic status (Raphael 1998), for health education to be effective it must include a social component and deal with the empowerment of the individual. The implications of this perspective are that issues like nutrition should not be dealt with in isolation neither should they be portrayed as problems of the individual. The health promoting school coordinates teaching about life skills, health and social issues in order to promote critical thinking and empowered health choices among students. So, classroom activities are combined with interventions in school milieux and the establishment of links between the school and family and community / social health services (Tones 1996).

A number of the aforementioned nutrition programmes reflect the means and the philosophy of HPM, suggesting either that this movement is the tip only of the iceberg of an ever growing awareness of the social dimension of health or that the HPM has already exerted significant impact on health education internationally.

Other schools or educational systems have deliberately chosen the platform of the HPM to deal with urgent health problems or to guide their health policy. An example of the first case is the way that the problem of laxative abuse among girls in an Australian high school was tackled (O'Dea *et al.* 2000). After collaboration among a local health educator, students and parents it was agreed that the following three key questions should be addressed:

- What they were teaching in the curriculum about the problem?
- Did the school environment promote a slim body image?
- What did the girls know about the issue and where could they get help for eating problems?

Addressing the first question the curriculum was changed so as to describe societal expectations about females and the responsibility of individuals to promote more realistic body norms. The staff, especially Physical Education teachers, discussed whether they implied the slim ideal in their lessons. It was decided that labeling of 'junk food' or 'bad food' should be avoided by teachers and parents, as it could induce negative feelings about food. Finally, links between community health services and school were established.

Last of all, Hurrelmann and associates (1995) in an article addressed to those German schools, where the framework of HPM is endorsed, suggests that health education should be substantiated through four dimensions:

1. The curricular dimension. Children's and adolescents' subjective concepts of health and illness are addressed. Skills in dealing with interpersonal conflict, asserting one's position without alienating others, gaining acceptance and confronting rejection are taught.
2. The social dimension. The school builds a broad consensus among students, parents and teachers that it is beneficial for society and individuals to promote physical, mental, social and psychological health.
3. The ecological dimension. Good buildings and working conditions are offered and nutritionally well-balanced food and drink are introduced on the school premises.
4. The community dimension. The school is opened up to the vocational sector and other institutions of the community so that adolescents and teachers are integrated into the life of the community. At the same time, the school becomes a resource for the community, where different activities are welcome.

The healthy growth of the individual in this system is described as

> "... the acquisition of social, psychological, and physical competencies which enable individuals to act adequately and develop an identity of their own, at the same time taking into account their needs and personality structures" (ibid p. 121).

2.3.2.3 The utility of the Social Psychological Theories

More than the validity of a theory rendered by its predictive ability (see Section 2.3.1.4), it is its potential to bring about positive results when applied in social interventions that adds to its value. Some conclusions about the utility of SPTs can be drawn from the preceding review.

For the tailoring of nutrition programmes many strategies originating from concepts met in SPTs have been applied:

- **Creating consensus** about the objectives and the tactics of the programme. Especially in programmes targeting adolescents or adults, the securing or building of mutually agreed positive attitudes among the participants is considered as a sine qua non prerequisite.

- **Knowledge** about the facts of nutrition. Almost all the programmes presented include some kind of information sessions. This information regarded either principles knowledge or how-to-knowledge.
- **Practical activity** related to dietary behaviour. In many cases there have been organized sessions of taste testing, while in other cases individuals have been involved in cooking, shopping etc.
- **Mental skills** related to dietary behaviour. Considering the economic and social factors that determine participants' eating habits is believed to make reasoned choices self-evident.
- **Psychological empowerment** of the individuals is a common goal of nutrition programmes. The raising of self-efficacy is the most frequent aim in this area.
- **Social support** is often seen as a means of precipitating dietary modification. Typical tactics are parents' involvement in school interventions and co-workers' involvement in work site interventions.
- **Use of models** (peer leaders, sport celebrities etc) for the promotion of eating practices, especially among young pupils. The opposite objective, i.e. critical positioning against body image norms and the acquisition of general **social skills** related to the adoption of and persistence of a particular eating profile, is reported in recent programmes targeting adolescents.
- Identifying and **eliminating the barriers** that prevent the adoption of desired eating habits. Building up the favourable school, home, market, community and social environment is a more systematic effort of eliminating these barriers.

It has to be mentioned, though, that the most recent development in nutrition programmes, the Health Promoting School framework, has **outflanked** the above mentioned strategies. HPM suggests a holistic approach to health education. The term 'holistic' refers to the meaning of health as well as the content of health education (see Section 2.3.2.2). For HPM, balanced diet is a component of healthy living and health refers not only to bodily health, which so far has been the purpose and the ideal of nutrition programmes, but to psychomental well-being, socio-economic consolidation and environmental balance.

The programmes that have been reviewed had **inconsistent results** in the field of eating habits. Any attempt to attribute their success or the lack of success to particular characteristics of the planning and the execution of the programmes would be a precarious generalization. Consequently, the success or failure of these programmes cannot be credited to the theoretical premises on which they were founded.

Eating behaviour is a multi-faceted phenomenon which can hardly be codified and is determined by long term and complex processes. So for any nutritional intervention, attempting to modify the dietary habits of the participants is a very ambitious goal. In an article dealing with exercising habits (Aarts *et al.* 1997), the authors argue that "a habit has been formed that no longer needs to be guided by reasoned considerations" (ibid p.369). Perhaps this is what happens with dietary habits as well. For nutrition interventions to provoke the "reasoned considerations" about diet should be the most realistic result that their organizers could aspire to. The formation of habits should be left to the participants.

2.4 Conclusion

From the literature reviewed so far we can conclude that the Social Psychological Theories have directed research that explained peoples' eating habits and guided more or less successful nutrition programmes. So it would not be an exaggeration to assert that SPTs have fulfilled their "raison d'être" as far as nutrition is concerned. Two points, though, reveal a tension between the theoretical approach and fieldwork.

The first point has to do with **some valid theoretical concepts that have been ignored by nutrition programmes**. In Section 2.3.1.4 it was shown that a number of concepts predict eating habits. All of those concepts are psychological parameters of the individuals except the (self-evident) practicality of the particular eating behaviour. Some of those concepts have been exploited, but some others have not. Favourable attitudes, willingness to comply with social pressure and high self-efficacy are those that have been exploited. Health concern, health locus of control, perceived illness susceptibility, and concern with appearance have not been exploited.

There is a difference among the group of concepts that have been exploited and those that have not been exploited. If we omit the willingness to comply with social pressure, the other attributes of the first group, i.e. perceived self-efficacy and favourable attitudes, are attributes that can be nurtured. For instance, consolidation of the knowledge about the beneficial role that fruit and vegetable can play in our diet may result in positive attitudes about this type of diet. Similarly, successful attempts to substitute butter with plant oil may result in positive attitudes about plant oil. Indeed, this kind of intervention characterizes most of the nutrition programmes. However, little can be done to change a person's dependence on social norms. Similarly, for a person not characterized by health consciousness little can be done to change; people sensitive about their appearance usually remain so for all their lives; and people who believe that their fate is determined are very difficult to persuade to adopt healthy habits if they are not accustomed to them.

This predilection of nutrition programmes to work on psychological parameters that can be affected by teaching or experience is quite reasonable. However, the other parameters which appear less flexible, and constitute millstones of the personality of the individual, should not be ignored. Considering the variance of the audience of a nutrition programme would mean individualizing the intervention according to the personalities of the participants of the programme making it more relevant to their personal needs and speaking the languages that participants are prepared to hear. To use the language of DOIT, such a consideration would mean a greater probability of selective exposure and selective perception, more obvious relative advantage and better compatibility with existing values of the participants. To give an example, it would be rather ineffectual to speak to young people concerned with body image about the benefits of balanced diet in terms of the prevention of ill health. On the contrary, it would be more realistic to speak to them about the benefits of this type of diet for matters of weight control, energy provision or growth.

The second point that shows a tension between nutritional interventions and SPTs is the recent development of **holistic health education**. Most SPTs propose a model according to which health issues like nutrition are considered separately and are met one at a time. People are expected to be convinced to adopt specific practices when exposed to information, arguments and practices pertaining to the medicine discipline. In harmony with this model of concrete goals, nutrition programmes have been planned so as to target specific dietary habits (i.e. cut down on fat, eat at least five portions of fruit and vegetables per day etc). The limited success of these traditional programmes in the field of dietary change (2.3.3) serves as an obvious cause of dispute of this model. So, it is challenged by the new paradigm of holistic health education whose most common expression in formal education is the Health Promoting School. Issues of health cannot be analyzed, cannot be separated from the socio-economic milieu and cannot be tackled successfully on an individual level. The community and social dimensions of health cannot be ignored.

The literature information presented in Section 2.1, according to which the Knowledge → Attitudes → Behaviour model was the most popular model in nutrition research and intervention, may no longer be valid. We may be witnessing the rising of a new paradigm, one that has a closer affinity with **reciprocal determinism** than with the other SPTs.

As argued in Section 2.3.1.4, the origin of human behaviour should not necessarily be sought in individual volition. Not that volition cannot play a vital role in the formation or modification of behaviour, but volition is not necessarily either the first or the catalytic cause for this. Consequently, in nutrition research and nutrition programmes we should address environmental (natural, social and economical) factors, personal factors (knowledge, attitudes and values) and behaviour with equal intensity and even priority.

Chapter 3: PURPOSE AND METHODS OF THE STUDY

3.1 Interviewing students: what for? why?

3.1.1 The perspective of the study

This study attempts to explore the **nutritional literacy of senior secondary school students** in Greece and the U.K. Senior secondary school is the last stage of formal general education in both countries. It is therefore an appropriate time at which to get an insight in the way that tomorrow's young adults speak and think about nutritional matters.

There is no standardized method by which to explore nutritional literacy. It depends rather on our understanding of nutritional literacy and learning. The first Chapter of this thesis dealt with nutritional literacy, while the second dealt with learning. Consequently, the perspective of this study is shaped by those viewpoints.

Since a balanced diet helps people attain good health, students' understanding of health is one of the things that has to be tackled. In the first Chapter it was stated that **health** is a dynamic state that can be defined both positively (euphoria, wellness) and negatively (absence of illnesses) and that it has to do with all the aspects of human nature (bodily, mental, social, environmental and transcendental). This wide definition of health is the theoretical premise of holistic health education (2.3.2.2 & 2.3.2.3). The way that the students **understand** health and the **personal value** that they put on it are issues that are worth exploring. As their understandings of diet will also be tackled in this research, it will be possible for someone to speculate as to how compatible are the means, i.e. diet, with the end, i.e. perceived health. In other words, some first conclusions may be drawn about how relevant to the students' understanding of health is the message of balanced diet.

One of the differences of holistic health education from the "Knowledge-Attitudes-Behaviour" model of health education lies in the integration of healthy objectives. This means that issues of health in holistic health education are not tackled individually but as a whole (2.4). This integration of objectives should not be complete though if it was not apparent in a balanced diet. In the same way that healthy living cannot be a selective adoption of certain healthy practices, healthy eating cannot be just eating low calorie products or adding fibre in our diets. For nutrition education this means that propagating specific eating modifications is a narrow sighted approach which should be abandoned in favour of a general balanced eating behaviour (1.3.3). It is interesting therefore to see where students are positioned in this dipole of separate eating modifications versus general balanced behaviour. If their perceptions about healthy diet are **comprehensive and valid** then they have the proper background to accept that balanced diet is a general behaviour. If their beliefs lie at the other extreme, being specific and scrappy, they possibly view balanced diet as a number of concrete dietary modifications.

Nutrition education cannot be reduced to a number of prescriptions. In part 1.4 it was concluded that the main challenge for nutrition education is to help people compose the proper dietary patterns that fit their own values, needs and preferences. Such a composition is not a simple task though. It presupposes the ability to analyze a message into its components, evaluate this message on the base of its content, probe into oneself so as to pinpoint one's values, preferences and attitudes, and finally synthesize all the answers into a resultant which is collectively called 'healthy dietary behaviour'. Although these **mental processes** sound somewhat demanding, one would expect that students who are about to complete their general education possess to some degree the skills to perform them. To what extent it is though, is a matter for educational research to uncover.

In Section 2.3.1.4 the establishment of healthy eating habits as the outcome of positive attitudes was disputed and it was shown that this one-way causative link cannot be confirmed by quantitative research. It was also argued that attitudes and behaviour are interrelated in a way which means that each of them can be seen as the cause of the other, in accordance with the model of reciprocal determinism (2.2.1). It is obvious, then, that in a piece of research dealing with students' ideas about healthy eating, their **eating habits and their health-related habits in general** cannot be disregarded. The particular interest here is the way that eating behaviour interacts with attitudes about healthy eating.

To sum up, in this study the nutritional literacy of the students is delineated with regard to five main questions:

- How do they understand health?
- How do they define healthy diet?
- What mental skills have they developed for making eating choices?
- How do their attitudes compare to their health-related habits?

For a deeper insight in students' understanding of a healthy diet one has to explore how they rationalize their beliefs and knowledge. All Social-Psychological Theories postulate that for people to formulate positive attitudes about a behaviour they must be convinced that this behaviour has a desirable effect on their lives and moreover that they value these effects, i.e. people are expected to rationalize the reputed 'healthy behaviour'. So, SCT and DOIT postulate that this rationalization is the outcome of knowledge and experience (2.2.1 - 2). The two other theories (HBM and TORA) emphasize that the rationalization of a behaviour depends mainly on mental persuasion (2.2.3 - 4). If, then, rationalization is necessary for putting positive attitudes about healthy eating on a solid basis, it is interesting to examine whether students **rationalize healthy eating** and if they do, in what mode. The findings of this study concerning students' metacognition about healthy diet are presented and discussed in the appendix 3.

3.1.2 The instrument of the study

Individual interviews with semi-structured schedules were considered the most suitable instrument for investigating students' ideas for the following reasons.

1. Interviews are generally more suitable instruments for social research when you want to listen to what interviewees have to say, whereas a questionnaire is more suitable for getting answers to closed questions.

2. Students would probably express their thoughts more freely and in greater detail in the course of a conversation than if they were asked to do so by filling in a piece of paper, which could be perceived as an examination in disguise.
3. The interviewer could have the option of probing a certain issue raised by the student and generally direct each interview to certain points that appeared to be relevant to or to have some special interest for the interviewee.

Some leading researchers on this field have in the past asked for more research through interviews. G. Auld and associates (1991) summarize the merits of interviews over questionnaires as follows:

> "Traditional true/false or multiple-choice formats tend to overestimate accessible knowledge because they cue respondents to acceptable answers, fail to probe memory, fail to identify common misconceptions, and do not indicate an individual's cognitive structure, i.e., organization of working knowledge. The probe interview is an alternative method of gathering sufficient data to compensate for these defects." (ibid p.1391)

Contento (1980) also suggests that nutrition educators should start using research techniques like participant observation, in-depth interviews, detailed description and qualitative field notes because they:

> "... must not lose sight of the fact that turning words into numbers, trends into prediction equations, and the behaviour of people into probability tables or standardized regression coefficients may frequently fail to help us understand better why people eat what they do, or whether our nutrition education efforts have been effective in terms that are meaningful to the participants." (Contento 1980, p. 441)

The technique of group interviews was avoided because it was thought of more as a technique helping to raise issues among the participants than mapping the thought of each individual. In group interviews usually the most assertive or the most articulate of the participants sets the standards on which all the rest of the interviewees are called to position themselves. For some of the participants there may be no real possibility of raising different issues.

It is generally recognized that an interview is not the best instrument for investigating people's actual eating habits because people sometimes say what they should be eating rather than what they actually eat. However, this shortcoming is especially important for surveys that attempt to give precise description of people's intakes. This is not the issue in this research. Students are asked to give an overview of their habits and in a second stage to comment on it. So, the problem is not whether they are accurate in their answers but whether what they describe as their usual diet is easily commented upon and whether they possess the mental skills to improve it.

It has to be admitted, though, that sincerity can hardly be tackled by conventional methods of social research, especially when dietary habits are considered. There is a debate going on in the dietary assessment literature about the research instruments that can better describe the dietary habits of a population. So far the most commonly used instruments are food frequency questionnaires and dietary recalls. Food frequency questionnaires are an inexpensive and practical method, fit for large-scale studies, which, however, lacks precision, as the kinds and quantities of foods appearing on it are inflexible. It has been suggested that food frequency questionnaires should be developed through cognitive interviews with representatives of the sample in which these questionnaires are going to be used. Thus, comprehension and ease of administration of the questionnaires are expected to improve (Subar *et al.*, 1995). Other researchers have found that the reproducibility of food frequency questionnaires used to assess diets of older children and adolescents was reasonably high, although the second completion of the same questionnaires showed that energy and foods intake was significantly lower (Rockett *et al.*, 1995). More objective methods of dietary assessment include observation by researchers (Crawford *et al.*, 1994) and weighed food records (Green *et al.*, 1998). With the use of such methods extensive evidence has been found that the sincerity of people recording their eating habits changes with the situation that they are in. So, it was found that malnourished children overestimate their overall intakes of energy, fat and protein when they assess their foods with recall methods (Anselmo Olinto *et al.*, 1995). In another study many participants who believed that should be on a diet confessed that they would change their dietary habits during the period of diet recall so as to provide more desirable data (Mela *et al.*, 1997). Similar evidence was obtained by Kristal et al. (1998) who found that even a modest dietary intervention could bias dietary assessment based on self-report. But even the validity of more 'objective' tools like weighed food records is questioned when it is combined with parallel screening of serum concentration of certain nutrients (Green *et al.* 1998).

At a time when the medical approach in health education is being strongly challenged, techniques like closed questionnaires can be seen as a guiding strategy in disguise rather than as an unbiased instrument of research. On the contrary, interviews are more appropriate for promoting communication and reflexivity between experts and non-experts "through a mutual understanding of each others' concerns" (Coveney 1998, p. 463).

3.1.3 Studies of similar interest

Some researchers have in the latest decade carried out surveys with similar objectives but different perspectives. What follows is an overview of those surveys focusing on their perspectives and methods.

Resnicow and associates (1991) investigated students' knowledge about fat, fibre and cholesterol in five states of the USA. This survey was carried out through questionnaires. Students were obtained from all the grades of primary and secondary school and the questionnaires were properly modified for each stage. The distinctive significance of this research lies in the comparative statistics of the answers given by students of different stages, which reflect the nutrition knowledge "maturation" of young Americans. For instance, it was found that 51% of the 1-2 grade level pupils believe that there is fibre in fish, while this percentage gradually declines to 24% for 10-12 grade level students.

The questions that were addressed to 10-12 grade level students, a cohort similar to the sample of the present study, were about the physiology of nutrients and the composition of foods.

The survey undertaken by the **Health Education Authority (1992)** in Great Britain explored health-related attitudes and behaviours held by 16 to 19 year old young adults, with diet being one of those behaviours. The instrument used for this survey was a structured interview in which interviewees had to select those sentences that described best their practices or views or to rate some other sentences so as to show their degree of agreement or disagreement. The type of questions regarding their views and practices about food and health can be categorized in five groups:

1. Describing actual eating practices (most of the questions)
2. Describing diet-related activities (shopping, places of eating)
3. Characterizing the general profile of their diet
4. General beliefs about healthy food without defining it or portraying its aims.
5. Health-related activities.

Compared to the present study, the HEA survey was more concerned with young people's eating behaviours than with their attitudes. The instrument used in the HEA survey was likely to have elicited some replies that the interviewees would probably not have given if they had been asked open-ended questions. It is different, for instance, to ask whether or not someone looks at food labels and for which reason, from asking:

> "which of the following ingredients, if any, do you look for on a list of ingredients on food labels because you would like to *avoid* them in your diet?
>
> a. Additives
>
> b. Artificial colours
>
> c. E numbers
>
> d. Fat (unspecified)
>
> e. -animal fat
>
> f. -vegetable fat
>
> h. Artificial flavourings
>
> i. Salt
>
> j. Sugar
>
> Other
>
> Nothing
>
> Don't know"

There are many cues and many things that are taken for granted here which should normally have been issues for discussion, like the fact that fat and sugar are nutrients to avoid, whereas starch is not. The same applies to the artificial additives.

It can hardly be characterized as an unbiased instrument investigating people's beliefs when they are introduced to the idea that additives have to be avoided.

Another difference between this study and the HEA survey lies in the meaning given to terms like 'perceptions' and 'attitudes'. 'Perception of health' in the HEA survey is tantamount to 'rating of one's own-health' whereas in this research it means 'understanding of health'. 'Attitudes towards healthy diet' in the HEA survey sometimes means 'profile of own eating practices' and some times 'value put on healthy diet', without examining what healthy diet is. These differences in the use of terms reveal a difference of perspectives. The HEA survey's primary interest lies in young peoples' self-assessment of health-related behaviours. The present research is interested in mapping the affective and cognitive mechanisms that may be responsible for these health-related behaviours.

In a study that involved four hundred high secondary Australian students, **Gracey and associates (1996)** using questionnaires examined the stage of change, the self-efficacy, the control over food, the beliefs about the existence of links between diet and health, nutritional knowledge, the variety of food consumed, and the frequency of fat, salt, fish, soft drinks and water intakes in the diet. There were also some questions about what the students thought were barriers to diet improvement. Although the range of issues examined was very wide, and these issues were according to SPTs critical for the adoption of healthy eating habits, the findings from the different issues were not systematically interconnected.

In their study **Seaman and associates (1997)** involved 157 Scottish pupils in their 1st year of secondary school. A questionnaire was again the instrument used. The issues examined were diet concern, sources of information about healthy diet, beliefs about healthy diet and the pupils' eating habits. There were also some questions trying to identify the barriers that prevent pupils from adopting healthy eating habits.

Povey and associates (1998) investigated adults' ideas about what constitutes a healthy diet and their eating habits. This was a double study. In the first part 48 British adults were interviewed with the purpose of pinpointing healthy and unhealthy foods. In the second part of the study, the participants were asked through questionnaires "to what extent the consumption of these foods were healthy or unhealthy". In another questionnaire the same persons were asked how often they consumed the given foods. The foods included in these questionnaires were those that had been classified as healthy or unhealthy in the first part of the study.

The use of interviews and questionnaires as instruments of a study combines the merits of minimum influence of the participants with a wide sample. Such methods require, of course, proper economic support. The participants in both parts of this study were paid for their contributions.

British adults were also the participants of the study carried out by **Parmenter and associates (2000)**. The sample of this study consisted of 1500 persons of any age elicited from GP records, while the instrument of the study was a questionnaire. The issues under discussion were peoples' ideas about the meaning of healthy diet, food composition, the skills of the participants to make sound food choices and their beliefs about diet-disease relationships.

Study:	Resnicow *et al.*	HEA	Gracey *et al.*	Seaman *et al.*	Povey *et al.*	Parmenter *et al.*
Year	1991	1992	1996	1997	1998	2000
Quest/re (Q) or interview (I)	Q	I	Q	Q	I & Q	Q
Students (S) or adults (A)	S	A	S	S	A	A
Health attitudes		+				
What is healthy diet?				+	+	+
Food composition	+		+			+
Mental skills						+
Diet-health links	+		+	+		+
Eating habits		+	+	+	+	
Health-related habits		+				
Psychological attributes			+			
Barriers of diet			+	+		

TABLE 1: The perspectives of the studies dealing with healthy diet perceptions

A glance at the table 1 reveals that the most frequently examined components of attitudes towards healthy diet are (1) the links between diet and health and (2) eating habits. The two studies that did not examine eating habits looked at participants' knowledge about nutrition, thus implying that cognition per se is an independent factor which (through attitudinal work?) can modify eating behaviour. This psychological mechanism was challenged in Section 2.3.1.4.

Food composition is an instance of knowledge referred to by some authors as inert knowledge, i.e. knowledge that exists but it is doubtful whether or not it is used in everyday life. To make this remark clearer let us consider a question posed to the students in the Resnicow et al. study:

"Is there fibre in this food?

Whole wheat bread

Beans

Vegetables

Fruit

Bran cereal

Fish

Cheese"

A student may correctly identify the foods containing fibre, yet s/he may not use this knowledge in order to make food choices. This is called inert knowledge. What is useful to look at though, regarding food choices, is the operational knowledge, i.e. the ready-to-use-knowledge or the knowledge that the subject is accustomed to use. If we want to know whether students are able to use this knowledge then we must ask them about healthy food choices. As we can see in table 1, three studies have looked at students' 'inert knowledge', but only one of them has looked at peoples' ability to use this knowledge.

What has been said so far in this Section is how the purpose of this research differs from similar research carried out recently. There is not much research with similar content. The new element that this research aspires to bring about is an attempt to integrate the mental, psychological and aesthetic processes that affect some students' eating profiles.

Finally, it must be mentioned that only one study has looked at participants' general health concerns (attitudes about health and health-related habits). Studies which examine each respondent's attitudes only to healthy diet, instead of his/her general attitudes towards health, predispose the respondent for a narrow interpretation of healthy diet and fail to examine how relevant the maintained ideas are to the individual's values.

3.1.4 The sample of the study

The sample of this study consists of young people who are on the verge of completing their general education. The researcher, a science teacher in secondary education, was motivated to conduct this study by a general question: "**To what extent does formal schooling generally and science education in particular help students to develop positive attitudes and useful skills for their lives?**".

It is not implied here that the attitudes and skills that students have developed should be attributed exclusively to their formal education. Diet is nowadays an issue of general debate and concern. People may learn about what constitutes a healthy diet from many different sources: their families, the media, school, shopping etc. However, the acquisition of aspects of nutritional literacy such as comprehensiveness of understanding of healthy diet, rationalization of healthy diet and mental skills for making healthy food choices (see Section 3.1.1) require systematic education which only formal schooling is likely to provide for people of this age. To use terms of DOIT, the acquisition of principles knowledge (2.2.2) for young people can only be obtained in school. So any gaps in students' knowledge or any difficulty in rationalizing their beliefs should pose questions in regard of the competence of nutrition education in schools.

As the key interest of this study was to investigate how secondary education helps young people to clarify the effect that diet has on health and to shape a sound model of healthy diet, it was obvious that the sample should consist of students who already had completed, or were about to complete, their secondary education. Students of an earlier stage would possibly have not received all teaching that their school would provide on this subject.

The **number of students** that were finally interviewed was a compromise between the need to undertake a sufficient number of interviews in order to obtain some kind of confidence in the findings and on the other hand to contain the amount of work needed for interview transcription, analysis etc within the time limits available for the research. So, the original plan was for 40 students to be interviewed: 20 in Greece and 20 in Britain. The initial decision for the sample size was open to revision though. In qualitative research one has to be alert to the possibility of coming across cases that open up the discourse by adding new issues and perspectives. In this study this was not the case though. The systemic network that was set up to contain the data elicited from the three pilot interviews accounted for the 95% of the responses that were given in the main field-work. With a few extensions and modifications it accommodated all the data of the fieldwork well before the last interviews were edited. This was a signal that the search for new data had come to a point of saturation and that the originally planned number of interviews was sufficient to provide a wide spectrum of the ideas that students entertain on this issue.

Two priorities determined the **number of schools** from which the sample was drawn. First, the number of schools would be inversely proportional to the number of students to be approached in each school. Five to seven students was found to be a reasonable number of students per school, a number that allowed students of all abilities to be interviewed in each school, while at the same time it was not too large to result in extended "contamination", i.e. leak of the questions taking place in the course of the interviews. Secondly, the number of schools to be visited should allow for some diversity in health-policies and teaching practices. So, finally, it was decided that three or four schools in each country would satisfy both these priorities.

Schools in Great Britain are more independent than those in Greece in planning their own programme of studies along the guidelines of the National Curriculum. In Greece the official text-books favour a more uniform pattern of teaching (see Section 1. 5). To experience better the variability in British schools, four schools were visited in Britain whereas in Greece only three.

Initially, it was thought that it would be plausible to include in the study schools and students that had in the past participated in the project "Science across Europe" and had used the materials called "What did you eat?". The author had in the previous year been involved in an evaluation of this project as a whole (Sinigalias & Turner 1997) and was examining the possibility of searching the educational merits of the specific materials mentioned above by comparing the ideas of students who had used the materials with those of students who had not. But this was finally not viable for a number of reasons: first the "What did you eat?" materials had been introduced to a very small number of Greek secondary schools and this would introduce two new variables into the British sample but not the Greek one. Given the restricted size of the samples the comparisons would start to appear very insignificant.

So the idea of making a parallel evaluation of a special set of materials about healthy eating was finally abandoned and it was decided that the schools would be "baseline" secondary schools situated in urban areas. The details of contacting schools and selecting the students are given in Sections 3.3.1 and 3.3.2. In this latter Section there is also a table of showing the numbers of students in each school and their gender.

3.2 Developing the schedule for the main fieldwork: the three pilot studies

In the following pages the developing of the schedule for a proper interview is described. This process consisted of **three first series of pilot interviews** with evolving schedules. At the same time the researcher was reviewing the literature on healthy eating and on Social Psychological theories. So it can be said that the origin of the schedule of the interviews is partly empirical and partly theoretical. Section 3.2 is a description of the empirical part of the development. The rationale behind each one of the questions can easily be traced in the theoretical Chapters. What is here portrayed is the attempt to make the questions more challenging, sharp and fruitful. After each series of pilot interviews an elementary analysis was carried out so as to assess the searching ability of each schedule. Section 3.3 introduces the schedules used in the **final two series of interviews which form the main field-work** and describes the details of selecting the students for it.

3.2.1 The first series of interviews

The first series of interviews was performed on a schedule (appearing in appendix no 2) that consisted of 23 questions. Seven interviews based on this schedule were taken in summer and early autumn 1995 in the students' homes in Greece. The interviewees were 6 boys and 1 girl in their final year of secondary school, except that one 23 years old student who was interviewed to obtain a feeling for how distinct are younger students' language and perceptions. The interviewees were recruited from the researcher's circle of acquaintances in his home city of Patras. The schedule of questions, and the answers given by the students appear in concise form in Appendix no 2.

These interviews concentrated on the following three aspects:

1. Attitudes about health: Qs 1, 2, 3, 4, 5, 11, 13, 14, 20, 21 & 22.
2. Sources of information: Qs 6, 7, 8, 9, 10, 12 & 23.
3. Dietary change Qs 15, 16, 17, 18 & 19.

As this layout shows the main concern of these interviews was the foundation of the knowledge and the beliefs about healthy diet and less about knowledge itself or skills about making dietary choices. The students were approached and were asked to give an interview on matters of health and health-related habits, while the word 'diet' came late in the questions in order to avoid preoccupying the interviewee with healthy diet and so getting biased answers. It was thus expected that if an interviewee held really positive attitudes about diet these would be brought forward by the interviewee him/herself, without any prompt. In fact this technique worked. In 6 out of 7 interviews the respondents answered that healthy diet was among their priorities (see Section A.2.1, table A.1b). Interviewee no 6 though did not mention healthy eating among his priorities. However, this does not necessarily mean that he was unaware of the existence of healthy diet, nor that he did not value it. Later on in Qs 17 & 18 this interviewee revealed a little more about his attitudes on this matter.

The researcher thus realized that it was not a secure way of making an interviewee express his/her attitudes on a behavioural issue by asking about the interviewee's behaviour. So the first lesson that was learnt by this case was: **use different questions for probing the cognitive and the habitudinal profile of the interviewees.**

Another problem with this schedule was that it did not contain questions addressing those mental processes that are involved in healthy choices. Q. 17, which was designed to probe such skills, only asked whether the interviewees had ever tried to change their eating habits. The answers elicited did not illuminate the interviewees' mental abilities and revealed that healthy eating had different meaning for each one of them. The respondents' personal values and the ways that they processed their knowledge were also varied. Cases 1 and 2, for instance, spoke about reducing their total food intakes so as to lose weight. Cases 4, 6 & 7 spoke about changing the kinds of food that they ate. Case 6 spoke exclusively in terms of foods, whereas 4 & 7 used nutrients in their reasoning. So, the researcher had some more lessons from this analysis. **The meaning of healthy diet had to be addressed explicitly and the investigation of mental processes related to diet had to be more systematic.**

In the analysis of these interviews it became obvious that the respondents had not been encouraged to elaborate on any connections between diet and health. Although in their answers they connected the positive aspects of health, like activities and sports with diet (see answers in Q. 5), they did not show that they perceived diet as a factor by which we can prevent some diseases nor in what ways this happens. Having said that, cases 3 and 5 named bad diet as one of the causes of common diseases. But **which specific diet and of which diseases?** Which are the food related diseases? Those matters had to be addressed explicitly. Lesson three.

The greater disappointment though came from the limited information related to the beliefs and knowledge that the interviewees had about healthy diet. The schedule seemed not to challenge them to speak extensively on this matter. The policy of letting them speak spontaneously on the subject did not bring about **enough information** and consequently had to be abandoned with the risk of inducing a positive bias in the students interviewed.

3.2.2 The second series of interviews

The lessons taken from the first series of interviews were incorporated into a new schedule. The new schedule and the analysis of the answers given from the second series of interviews appear in Appendix Section A.2.2. The schedule consisted of 19 questions. They can be grouped in four categories:

1. Perception of and attitudes about health: Qs 1, 2, 3, 4, 10, 11, 12 & 13.
2. Knowledge and beliefs about healthy diet: Qs 7, 8, 9, 14, 15, 17 & 19.

3. Dietary and other habits: Qs 4, 5, 6 & 7.
4. Mental processes related to diet: Qs 14, 15, 16 & 18.

Compared to the schedule of the first series of interviews this schedule had the following major changes:

The questions about the sources of information were removed. This decision was made because the relevant questions claimed much of the time of the discussion and time had to be made for addressing other crucial issues. There had to be an upper limit for each interview, which was set at 30 minutes. This time was thought of as being the longest one that permitted the attention and concentration of the students to be retained throughout the interview. Later on, the omission of questions about sources of information was thought of as very radical, and these questions were brought back in the main fieldwork.

The questions dealing with the perceptions about health were slightly changed. The interview no longer started with such personal questions, as it did in the first series, because this could cause some embarrassment to some interviewees who did not consider themselves as fit enough and because it was thought that the discussion would be facilitated if the idea of a healthy model was introduced.

Qs. 10,11,12 & 13, also present in the previous series of interviews in different order, were clustered here together because they addressed the human diseases collectively: causes and effects in society. The summary of these questions was: which are the most threatening diseases, from a statistical point of view and can we do anything to protect ourselves against them, or they depend absolutely on genetical predisposition? Does diet come up into the discussion? Especially Q. 13 was prompted by Biology Syllabus in Greek schools, where students of year 11 are taught that phenotype is determined by the genotype and the environment. An analogous question with the scientific terminology was included in the first series of interviews but was omitted because it connoted examinations. What matters more than the memorization of biological laws is the attitudes about life that these laws generate.

Q. 14 asked for the interpretation of the pie chart named "the Balance of Good Health", issued by the Health Education Authority (appears in Appendix no 2). The printed prompts (choose a wide variety..., try not to eat..., etc) were removed. Q. 15 demanded for an explanation of this chart. This question was partly an exercise because it had to do with the processing of given data and partly a question of beliefs because the interviewee would explain it, or oppose to it, in the light of his/her already formulated beliefs about healthy diet. Qs. 16-18 constituted a more intricate exercise. Interviewees were presented with a table taken from the 1990 World Health Organization report (appears in Appendix no 2), summarizing "the strength of association between dietary components and cancers at various sites" (World Health Organization 1990, pp. 66,67). The interviewees were asked to explain the meaning of the table. Then, they were asked to comment on it and finally they were asked to improvise a proper diet in terms of foods, not of nutrients, which would take account of the figures presented in the table. Q. 19 (What would be the results if these recommendations were adopted?) tried to probe into the students' perception of prevention. How did they imagine it? Was it total avoidance, reduction of possibility or something else?

This schedule was tested in an independent boarding school for boys situated close to Reading, on 9 November 1995. Four 15-year-old and four 17-year-old male students were interviewed. This fieldwork was carried out with the active help and participation of a fellow research student in the Institute of Education who had been a teacher in this school. The responses of the students interviewed were transcribed in a brief form and then put together in tables. One of the transcriptions and the tables of the summarized answers are presented in Appendix no 2. In this presentation the 15-year-olds appear as cases 1-4 and the 17-year-olds are cases 5-8.

The **analysis** of the students' responses showed that:

1. Perceptions of and attitudes about health (Qs 1, 2, 3, 4, 10, 11, 12 & 13, table A.3a in Section A.2.2.3)

Most of the students tended to speak about bodily health and to define it in a positive way, i.e. in connection with abilities, activities, sports etc and did not refer to diseases or disabilities unless prompted to do so. Five of them identified healthy habits with health itself. The common diseases named by them were mainly infectious and only three of them referred to common degenerative or chronic diseases. On the other hand, the diseases with the greater number of victims were considered to be mainly degenerative and only one student referred to lethal infectious diseases. Equal numbers of students (6) identified infections and habits as the causes of diseases. Among habits, diet was named by five students. The environment was named by all of the students as factor that can nurture diseases. However, personal susceptibility was considered by just two students, one of them speaking about hereditary predisposition and the other about low immunity.

The analysis revealed that this set of questions had been much more successful than the analogous ones in the previous series in revealing students' beliefs about health. Their cognitive orientation was the main reason for this.

2. Knowledge and beliefs about healthy diet (Qs 7, 8, 9, 14, 15, 17 & 19, table A.3b in Section A.2.2.3)

The reasons that these young men looked after their diets could be categorized in two groups. The first one included quite definite goals: their appearance, their performance and their dental hygiene. The second group included healthy recommendations: getting all the nutrients and "taking the good and avoiding the bad things for you". Those students that used reasons from the one group did not use reasons from the other one except for case 4. Another interesting point is that the younger boys used mainly reasons from the second group and the older boys from the first. Speaking about the results of healthy diet in Q. 19, 6 out of 8 students used statistical terms to define the results of this diet, i.e., the decreased chance of getting cancer and the drop in occurrence of cancer. However 4 of them spoke about improvement of health in individuals. This attitude prevailed among younger boys (table A.3e).

Qs 14 and 15 were posed in order to make students reveal their underlying knowledge with regard to diet. Their responses, though, proved laconic. They spoke generally about the provision of nutrients but they did not refer to specific nutrients or about their physiology. It was decided that these questions should become more leading in order to make students more eloquent. The reservations expressed were very interesting. A boy was surprised by the low amount of meat depicted on the pie chart. The same boy thought that dietary fibre builds up muscles. He obviously confused muscle fibre with dietary fibre.

3. Dietary and other habits (Qs 4, 5, 6 & 7 table A.3c in Section A.2.2.3)

All the boys said that they were very keen about sports. Four of them included diet care as one of their priorities and the rest of them, when asked about their dietary habits, said that they either try to have a healthy diet (two of them) or that they rarely look after their diet (the remaining two). The younger boys appeared to be more diet conscious than their older peers. The fact is that, particularly at that age, one can never be sure if this is indeed the case, or if the talkers just try to give the answers that the interviewer (confused with the examiner) would like to hear. However, the content of some answers was still not considered to be adequate. Each student referred to some aspects of his diet and so the data collected were not comparable. Anyway, a clear picture of their eating habits was not given. It was obvious that the relevant questions had to become more searching.

The foods that the boys said they ate were as follows. On average each of them referred to 4 foods and two of them referred to variety as well. Meat and vegetables appeared to be the two most popular foods being preferred by four eaters. All the other foods including fruits were named just in one case. Fatty foods were avoided by two boys.

4. Mental processes related to diet (Qs 14, 15, 16 & 18, tables A.3d and A.3e in Section A.2.2.3)

The reading of the 'HEA plate' proved to be an exercise that investigated with some success the way that those boys dealt with nutritional data. Four of them recognized the variety of the foods in the plate and five of them the recommended proportionality of intake for the different food groups. Only two of the boys failed to recognize both the variety and the proportionality message. Two of them recognized also a trend in it: the avoidance of much dietary fat.

The 'WHO table' was also an interesting attempt. All but one managed to interpret it. However, four of them gave a rather disconcerting interpretation of it which can be summarized as "some foods CAUSE cancer more than others". Four also gave a more successful interpretation speaking about decreasing the chances of getting cancer. The recommendations, i.e. what we should eat according to this table, were generally very successful. The average number of recommendations was 5, the greater 9 and the lowest 3. Just one boy gave two wrong recommendations. Those wrong recommendations were that we must consume meat for fibre and that we must avoid sugar for cutting down on fat. It was the same boy that said that dietary fibre builds up muscles in Q. 15 and the same one who had difficulties in interpreting the table.

Though the harvest of this series of interviews was better compared to the first one both in terms of areas of interest covered and in depth of investigation, it was decided that another pilot test should be carried out with a revised schedule. The new schedule should include more penetrating questions in matters of knowledge, eating habits and mental processes.

3.2.3 The third series of interviews

The schedule for the third series of pilot interviews appears in Section A.2.3 of the Appendices. The areas of interest remained the same as those in the second series of interviews. A question was added though, asking the interviewee to provide reasons for his/her beliefs on healthy diet. The 'WHO table' was also replaced with another one, also appearing in Appendix no 2. This replacement was decided for the following reasons: As mentioned in Section 3.2.2 some students in the previous series of interviews understood the (old) table as indicating that "some foods cause cancer more than others". The spreading of a negative idea should be avoided because it was inaccurate and could have negative consequences in students' attitudes about food. Even if they were told that nobody has ever maintained that certain foods cause cancer, it was not absolutely certain that their first idea would be eradicated. So it was first and foremost an ethical consideration to prevent any negative and false attitudes stemming from the interviews. Secondly, the table should give rise to a wider discussion on health and nutrients; in terms of health, by not restricting the diet-related diseases to cancer only; in terms of nutrients, by introducing more nutrients like proteins, carbohydrates etc. The discussion on a table like this could, in addition, give more information about the interviewee's cognition. The table used in this series was taken from the same WHO report (World Health Organization 1990, p. 108).

The new schedule was pilot tested with 6 Greek students aged 15 to 17. They were recruited from the wider social circle of the researcher. They all attended the type of school that is called General Lyceum. Further details of this type of school are given in Section 3.3. There were two students for each of the three years of Lyceum and boys and girls were represented in equal numbers in this sample. The interviews took place during the 1995 Christmas vacations in students' homes.

This series of interviews was more productive compared to the previous ones. Students spoke more extensively about their beliefs and were better prompted to give more explanations. The analysis of the responses concentrated on each student separately. This form of analysis was used in order to get a better insight of individuals' thought. Each interview was summarized and then analyzed in 6 tables. The transcript and the analysis for one such case appear in Section A.2.3.2 in Appendix no 2.

Here follows a brief analysis of the answers given. These answers led to a few more modifications of the schedule.

Q. 3. Five out of six interviewees responded emphatically "yes". But as vocal emphasis is a characteristic of personal expression, which does not necessarily indicate a great degree of agreement, the question was reworded to "how important is it for you to keep healthy?". It was expected that more graded answers would then be given.

Q. 4 was a question about habits, and to a lesser degree about attitudes. Case 5 in this question answered that she doesn't do many things about her health, except taking care about her weight. Answers like this did not illuminate the attitudinal component enough. So this question was split. The first half asked about the perceived as healthy habits and the second how many of those habits were adopted by the interviewee.

Qs 5 & 6 were replaced by one only question with multiple answers because this form of question was found to cover all the possible replies. In the next schedule this appears as Q. 11 as all the questions naming diet were transferred to the second part of the interview schedule, because it was decided to follow the from-general-to-specific tactic.

Q. 7 had the same fate as Q. 4 and for the same reasons. Only one student expressed an attitude in his answer saying: "I eat a variety in order to take all the vitamins", thus speaking about diet and beliefs at the same time. Some of the rest said that they avoid fatty foods and fast food. In this way they possibly expressed their belief that those two kind of food were damaging. It was not sure though that they expressed all their ideas about healthy eating. So this question was split into two more analytical questions. Beliefs and habits were separated. In the schedule of series 4 they appear as Qs 12a, 13a, or their alternatives 12b (beliefs) and Qs 10 and 11 (habits).

Q. 8, a versatile question, was reworded in order to become more theoretical and less personal. "Why do you consider it as healthy diet?". In the next schedule it appears as Q. 14a or 13.b.

Q. 9 was abandoned. 3 out of 6 students responded negatively. Two replied that they had at one time decided to cut down on the quantity of food for either improving their body image or for boosting their performance in sports and one replied that he had decided to cut down on chocolate because he had developed acne. Although this question could bring about some information about the students' eating history, other questions covered better the issue of habits and values which was really important.

Q. 13 was also abandoned. The reasons: economy of time and better concentration on the main issue. Three of the respondents maintained that the we must "live according to some rules" and the rest of them maintained that both heredity and habits "have a role to play". There was a positive relationship between older age-stage and the second reply.

Qs 14 & 15 (the 'HEA plate') were transferred after the questions about the 'WHO table'. The reason was that the students would be influenced by the HEA plate in their answers about the table. In the plate one could find food groups in certain proportions which were also endorsed by a health authority. But exactly this, i.e. kinds of food and proportions or quantities, was asked in the questions based on 'WHO table'. The opposite, i.e. the students being influenced by the 'WHO table' in their answers to the 'HEA plate' questions would be an acceptable mental process. These questions were looking at the mental skills of the students. If some students would be influenced by their previous answers which dealt with nutrients in explaining afterwards why the plate happened to be as it is, this would be a welcome outcome. From an educational point of view it is constructive to use assimilated facts in applicable occasions. The questions themselves changed. It was initially taken for granted that the students would recognize the message of the table without difficulty. But it proved to be the case that not all the students could. In Q. 15, for instance, two students answered: "these are the foods that we usually eat". The rest of the students recognized the imperative nature of the message. Q. 14 also was not very clear. Of course such (not very clear) questions usually bring about quite a great number of perspectives and ideas. So, some students explained the grouping on the basis of "good-bad for you", others spoke about their composition (contain many vitamins), others about their provenance (they come from plants) but most of them mixed up the different explanations. In the new schedule the questions referring to the 'HEA plate' invoked the impressions of the students (Q. 19) and examined their reasoning ability on a crucial feature of the plate (Q. 20).

Qs 16-19 related to the second exercise posed to the interviewees, based on the second (see Section 3.2.2) 'WHO table'. The first of those questions was found to be rather difficult, and thus intimidating, for the respondents in the third series, so it was abandoned in the next series of interviews. Q. 18 was transformed and transferred. The bad thing with it was that it took it for granted that young people ought to have formulated an all-round view on an extremely scientific matter. Some of the elicited answers showed the embarrassment of the students: "I don't know many things, but I agree". Some other tried to relate the data of the table to previous knowledge: "I agree. Many older people who have high cholesterol are told to avoid salt and fats". But what value can an answer like this have when it absolutely disregards the figures? This question was not appropriate for young people. Some of them expressed genuine reservations: "Not absolutely: the sugar. We must take some sugar because it gives energy". However, students do have a view about what healthy diet is and for this reason a similar question was created but for the 'HEA plate', which deals with foods. Students were more likely to express a genuine view about a certain type of diet instead of a prescription of nutrients.

Q. 21 was also transferred to the group of questions referring to the 'HEA plate'. Speaking about diet was seen again as more appropriate than speaking about nutrients. Its wording was also changed; it became personal - a question about barriers that the interviewees themselves would face in a possible attempt of diet moderation.

Hypothesizing about others' preferences was not seen as having much value, as we can see from the responses collected in the pilot testing. All the students found it unlikely that others would comply to this type of diet. The reasons given were: "harmful things are nice" (2), "especially sweets" (2), "habits are hard to change" (2), "fast food is trendy" (2) and "peers' influence" (1). A very bleak prospect indeed. The numbers in brackets represent the number of given responses. Only one of the respondents replied on a personal level: "If I was told to cut down on sweets, I would not comply".

Qs 20 & 22 were 'absorbed' by a more detailed question with multiple choice answers in the schedule of the next series, which is coded as Q. 24. The reason for this change was that some students gave answers that were not well defined and needed to be further explained. One such reply was: "they would be healthy". The rest of the students saw the results in the avoidance of diseases, on the improvement of body image and finally some of them confused the end (the results of this type of diet) with the means (the diet).

In Q. 23 three students answered positively, two answered that they already follow this type of diet and one (the transcript appears in the Appendix) answered that she simply could not resist the temptation of sweets and packed foods which, she believes, contain salt and fat. The last type of answer is the only one with value, because it provides reasoning. So, this question was also reworded. There is no value in inducing the verbal compliance of the students to a certain type of diet. Besides, students were asked to describe their eating habits in previous questions, when the WHO and HEA materials were not presented. In the schedule of series 4, this question was replaced by Q. 22.

In brief, the changes that were brought about in the interview schedule were in the direction of:

1. Improving the order of the questions so that there was a more consistent succession from general to specific and to avoid giving any clues that could influence the students' answers.
2. Separating the personal questions, usually to do with habits, from the cognitive ones.

3. Making the questions 'sharper' so as to help the students to concentrate on the specific areas that this study was on.

3.3 The main fieldwork: interviewing students in Greece and in England

3.3.1 The fourth series of interviews in Greece

3.3.1.1 Sampling

In April 1996 20 students, 10 boys and 10 girls aged 16 to 17 attending the penultimate year of secondary education, were interviewed. The type of their school was called General Lyceum[1]. This type of school prepares students for tertiary education but is also considered as the type of school which provides the students with general education. It lasts for three years, i.e. years 10-12 of general education. The tuition and the syllabus for the first two years were at that time common for all the students. Only in the last (the 12th) year were the students streamed in four different branches according to their orientation towards tertiary education.

The sample was selected among students of the General Lyceum because most of the students of this age attend this type of school. In other words, the General Lyceum provided a 'mainstream' sample of the secondary school students. It looked reasonable for the students to be interviewed in their last stages of general education because in the last year of the Lyceum students are streamed in four different branches and so the first stages of specialization set in. On the other hand, in this last year the syllabus constraints are so pressing that the schools' managements are rather reluctant to let any researcher interfere with their programme. The interviews were conducted on school premises.

Three schools were selected. They were inner city schools in Patras, a city of 170,000 population. A smaller number of schools would require more students to be

[1]From 1998 this type of Lyceum is renamed to 'Unified Lyceum', in Greek 'Ενιαίο Λύκειο'.

interviewed in each school, thus entailing great risk of contamination, i.e. leaking of the interview's schedule and a consequent lack of spontaneity on behalf of the students interviewed. Initially it was intended that the sample would be collected from four schools but the head teacher in one of the schools refused any cooperation since the author could not produce a permit document from the local Education Authority. This type of document had been requested two months before the fieldwork but as it turned out, it should have been requested at least one semester earlier for it to have been issued in time from the Ministry of Education. However, the local Education Authority agreed to give the author oral permission to visit any school of the area so long as the consent of the head teachers was obtained. The author had worked in the period 1983-1985 in this area as a supply teacher and so it was easy to contact some old colleagues in order to be introduced to the head teachers. This tactic worked in three out of four cases.

The gender of the students was not a problem as all the schools in Greece are mixed. However it was important to contact students of all levels of abilities. This was not always easy. In the first school the author had to negotiate the selection of students with the head teacher who was very keen on providing the "cream" of the school's students. Any attempt to negotiate her decision was kindly but firmly rejected. The decision was made to confine the number of interviews to six in that school with the hope that in the other two schools there would be a more mixed-abilities sample available. Indeed, some of the teachers there happened to be the author's ex-colleagues who kindly nominated students of average or below average abilities.

For obtaining a representative sample the selected students ought to have different educational orientations. For this reason in each school students were interviewed who intended to attend all four branches of specialization of the next year. In fact, the great majority of students have decided by the last term of this (11th) year the branch that they are going to follow the next (12th) year.

All the students who were approached were very willing to be interviewed. The interviews were carried out in Greek. The students that were interviewed had to leave their classes and the ongoing tuition. The interviews were carried on privately in allotted rooms.

3.3.1.2 Schedule of interview

The translation of the schedule of the interview appears in Appendix no 2. Most of the questions were developed in the previous stages of this fieldwork. There were however some new questions:

Q. 11 followed the pattern of a similar question which appeared in a survey undertaken by the HEA. The results of this survey were published in a book titled "Today's Young Adults" (HEA 1992, p. 20). The answers were slightly changed, though, in order to be less wordy and to convey a more immediate profile of eating. The students were also given the opportunity to choose more than one answer. These answers were not presented to them in a given order but each one of them was printed in a separate cartoon. These cartoons were presented to the talkers in a random order. Thus, inducement of favourite or right answers was avoided. The same technique was followed with all the multiple-choice questions. This additional question was intended to serve as a prompt for students to speak more extensively about their actual eating habits.

Q. 14 was intended to elicit any known mechanism of physiology of food in the human body. Most of the students, though, found it very difficult to understand its objective. Students experienced real difficulty in pinpointing any such mechanism perhaps because the question was not well focused. As the objective of this question might be covered by proper probing in the course of other questions, e.g. Qs 14a, 13b, 20 etc, question 14 was abandoned in the fifth series.

Qs 15 and 16 were the 'remnants' of the much more ambitious group of questions dealing with the sources of knowledge in the first series of interviews. The students were asked to name the possible sources of knowledge on this subject. Of course this is anything but a simple question to answer and for this reason the technique of multiple choice was chosen. The second of these questions asked the students to pinpoint those sources of knowledge that they felt were reliable irrespective of whether they had chosen those same sources in the previous question or not.

Finally, the WHO table for both series four and five was simplified and slightly changed, so as to appear more user friendly. All the footnotes were removed as they did not actually give any additional information. Once absolute fidelity to the WHO report was breached two further steps ahead were taken. First, the upper and lower limits of energy intakes were completed with the recommended caloric intakes for 15-18 males and the intakes for females of the same age (Ministry of Agriculture 1995). Secondly, the recommendation about polyunsaturated fatty acids was substituted with a recommendation about unsaturated fatty acids in general. Thus, mono-unsaturated fatty acids, which are the main components of olive oil (all-important for the Mediterranean diet) were not overlooked.

3.3.2 The fifth series of interviews in Great Britain

3.3.2.1 Sampling

Series 5 was initially scheduled to be carried out in schools around London during the 1996 summer term. The idea was to interview students in the last year of general education, as had happened with Greek students. For the British educational system this is the last year of key stage 4, i.e. the year when students take their GCSE examinations.

The timing of the interviews, however, proved anything but convenient. In May 1996 seven schools were contacted and permission was requested to interview students. Answers came from four of those schools which were all negative on the grounds that at that time of the year those students were either not attending lessons any more or they were very busy with their examinations. The options that were left were either to interview students of a lower year or to postpone the interviews to the start of next year and interview students of the next stage, known as lower sixth form. The first option was rejected because that year of education did not correspond to the year of the Greek sample. The completion of general education from the interviewees was seen as a 'sine qua non' prerequisite. The second option was finally preferred.

The first contacts with schools were arranged in June 1996 through the Initial Teacher Education office of the Institute of Education, University of London. Two secondary colleges within the Greater London area responded positively to the author's request to interview students at the start of the next school year. Those interviews were carried out in October. Seven students were interviewed in the first college and four more in the second.

In the first college the selection of the students was made on the basis of the availability of free time and, of course, willingness. In this stage of education there is an individual programme of attendance for each student, interspersed with some free periods due to the different subjects selected by each of them. So, interviews were conducted on the college premises during free periods. This selection provided a kind of randomization of the students. In the second college the students were selected by the Head of Science with whom the arrangement of the researcher's admission to the college was made. As this was not thought to be an ideally unbiased way of selecting interviewees the number of interviews taken there was limited to four.

Transcription of the interviews and inputting of the data to the analysis database followed immediately. The first results showed that all the students were in a sense very favourably disposed to what are considered as healthy habits. This was an indication that the sample was not representative of the whole population. On the other hand, having selected only sixth form students to speak with the researcher had omitted that group of the secondary school graduates who either opted for professional training or discontinued their studies. So, the next interviews were taken by young people who although having taken GCSE examinations did not follow subsequent academic studies.

Through the Initial Teacher Education office the researcher obtained the name and address of a college in central London which provided professional training for all the ages. Among the full and part-time courses offered at the college were business and law, language studies, science and mathematics, tourism, leisure and recreation, fitness and health, information technology and visual and performing arts. The director of student services was contacted and permission to enter the college and interview students was requested. This permission was kindly given with the proviso that the author could only contact students in the canteen of the college. The college was visited on the 14th of November. Approaching the students and asking for an interview proved not to be the most simple task. Many of them refused. Four students were finally interviewed. Making more contacts in the same college would not be a very wise thing to do because as the interviews were undertaken in the canteen everybody was aware of what was going on. This led to a very rapid contamination. The students interviewed were slightly older than the students interviewed so far. The oldest was 18 years old. However, all of them had taken some GCSE examinations very recently.

The final five interviews were conducted in April 1997. The contact with this school was again made through the Initial Teacher Education office of the Institute of Education. The teacher (a teacher of History) who arranged in advance the details of the interviews agreed to find a cross-sectional sample of five students: three boys and two girls attending the last year of keystage 4. At the time of interviews one of the boys selected for this purpose was not present and was finally substituted by a girl. So, the British sample comprises unequal number of boys and girls. The imbalance between boys and girls, though, was considered to be too small to introduce a significant partiality in favour of 'female attitudes'. On the other hand, comparative statistics do take account of differences in the number of sub-groups.

Another characteristic of the British sample is that it included students of different ethnic origins. Three were of Indian origin (cases 28, 30 and 34 in the SPSS database), one of Greek-Cypriot origin (case 40) and one of Chinese origin (case 35). All those students spoke English as their mother tongue and hereafter they are identified collectively as 'British'.

Table 2 summarizes the nationality, sex and school provenance of the students interviewed in the main fieldwork (interviews series 4 and 5).

	GREEK STUDENTS per SCHOOL			GREEK TOTALS	BRITISH STUDENTS per SCHOOL				BRITISH TOTALS	TOTALS
SCHOOL	A	B	C		D	E	F	G		
No of boys	3	2	5	10	4	2	1	2	9	19
No of girls	3	5	2	10	3	2	3	3	11	21
Total no of students	6	7	7	20	7	4	4	5	20	40

TABLE 2: The sample of the research

3.3.2.2 Schedule of interview

A few changes were made for this fifth and final series of interviews carried out in England. The order of Qs 6, 7 & 8 was altered so that the question about causes of diseases followed the questions about the frequencies of diseases. This was considered to be necessary because many students in the 4th series appeared not to understand the question when asked about the causes of diseases. It was thought that asking about the causes of diseases which the interviewee had just identified would be a more focused and clear question.

Q. 10 was also changed in the fifth series. Most interviewees in series four happened to use the verbs "to like" and "to eat" indiscriminately. So two more questions were introduced in order to remove any confusion and make the sketching of the eating profiles of the students easier. These additional questions were Qs 10 and 11.

One last question was added: Q. 19. In the forth series of interviews many students when asked what our diet should be in order to meet the recommendations cited in the WHO table appeared embarrassed. They either did not make quantitative suggestions or they gave a version that appeared to have very little to do with the information on the table; it was like an improvisation. This could be either because they were not familiar with the nutrients referred in the table or because they had not enough time to process the data appearing on the table. In the first eventuality there were not many things that one could do. For the second eventuality, though, the introduction of an additional question could help them concentrate better on the table. So students were asked to summarize the table in their own simpler terms. This proved to be a helpful bridge in connecting the table with their versions of healthy diet.

The schedule of the fifth series of interviews appears in Appendix no 2. Table 3 puts together the numbers of parallel questions of the last two series of interviews and groups them according to their content.

In Section 3.1 it was stated that students' attitudes about health constitute one of the components of their nutritional literacy. The questions through which this component was probed are the groups of questions with numbers 2 and 3 in table 3.

The 5th group of questions probed students' perceptions of healthy diet. The mental skills of the students were probed with the 7th and the 8th group of questions. The questions of groups 6 and 9 sought the way that students rationalize their understanding of healthy diet. Finally, the diet and health-related habits of the students were probed with questions in groups 1 and 4.

GROUP OF QUESTIONS	SUMMARY OF QUESTION	Code of question Series 4	Code of question Series 5
1. Preliminary personal questions	Age	-	-
	Stage-Grade	-	-
	Hobbies	-	-
	Favourite lessons	-	-
	Wants to become	-	-
2. The positive aspect of health:	Healthy appearances	Q. 1	Q. 1
	Definition of health	Q. 2	Q. 2
	Importance of personal health	Q. 3	Q. 3
	Perceived healthy habits	Q. 4	Q. 4
3. The negative aspect of health: Speaking about diseases	Common diseases	Q. 7	Q. 6
	Common lethal diseases	Q. 8	Q. 7
	Causes of diseases	Q. 6	Q. 8
4. Personal habits	Acquired healthy habits	Q. 5	Q. 5
	Personal protection from diseases	Q. 9	Q. 9
	The main meal of the day		Q. 10
	The breakfast		Q. 11
	Preferences	Q. 10	Q. 12
	Profile of eating habits	Q. 11	Q. 13
5. Perceived healthy diet	Is there a "healthy diet"?	Q. 12a	Q. 14a
	What is a "healthy diet"?	Q. 13a or Q. 12b	Q. 15a or Q. 14b
	Why is "healthy diet" like that?	Q. 14a or Q. 13b	Q. 16a or Q. 15b
	Physiology of food	Q. 14	
6. Sources of knowledge	Applied	Q. 15	Q. 16
	Valued	Q. 16	Q. 17
7. 1st Exercise: The WHO table	The diet related diseases	Q. 17	Q. 18
	Summarizing the nutrient intakes		Q. 19
	Proper diet to meet the nutrient intakes	Q. 18	Q. 20
8. 2nd Exercise: The HEA plate	Recognizing the message	Q. 19	Q. 21
	Reasoning the message	Q. 20	Q. 22
9. Positioning against the HEA plate	In practice	Q. 22	Q. 24
	In principle	Q. 23	Q. 25
	Comparing own diet to the 'plate'	Q. 21	Q. 23
	Pinpointing the results of this diet	Q. 24	Q. 26
10. Giving the interviewee the opportunity to put questions		Q. 25	Q. 27

TABLE 3: The Parallel Questions in Series Four and Five

Chapter 4: UNDERSTANDING OF HEALTH

4.1 Introduction

For a discussion about healthy diet to be purposeful, the participants should have a minimum common understanding of the notion of health. This Chapter searches to find out exactly how the subjects of this research understand health and how they value it. The use of this analysis is two-fold. Firstly, to seek out patterns of understanding of health. Secondly, the meaning that the specific students ascribe to health will later be collated to their beliefs about healthy diet, in an attempt to see how cohesive their thought is about health and healthy diet.

This Chapter (no 4) should be read in connection with Chapters 5, 6 and 7. They constitute the presentation and discussion of the findings of the interviews taken between April 1996 and April 1997 in Greece and Great Britain, which were named 4th and 5th series of interviews in Chapter 3. These findings are grouped as follows:
Chapter 4: The students' ideas about health
Chapter 5: The students' ideas about healthy diet
Chapter 6: The students' mental skills about dietary matters
Chapter 7: The students' health-related habits in connection with their beliefs
The students' critical positions on dietary matters is discussed in appendix no 3.

The findings of each Chapter do not stand independent of the rest. On the contrary, effort is made to relate them. For instance, how do students' ideas about what constitutes a healthy diet correspond to their ideas about health? In order to give answers to such kinds of questions the collected data were standardized, some variables were developed and statistical methods were deployed. This was seen as an essential strategy for making trends and common modes of thought more apparent.

The author is aware of the fact that the magnitude of the sample does not allow for definite conclusions to be drawn. In fact, this was not the purpose of this study. What is sought here is the emergence of issues. And this is done in a two-fold way: by "listening" to whatever students have said and by involving some basic statistics. So, in the analysis that follows the citations of dialogue and the quantitative argument are in continuous interplay.

Each citation is followed by the identity of the person and the question from which each piece of dialogue is selected in brackets. For instance the code (B.36, Q.26) has the following meaning: B stands for British. The respective code for the Greek students is G. 36 means the 36th person interviewed. The interviews in Greece and Britain were given continuous numbering. Q.26 means 26th question of the interview.

In some citations it was found necessary to add a few words to the original transcript in order to render the meaning of the students' sayings better. These words are always put in brackets. Such interventions are not infrequent when transcribing spoken word; it is important, though, that they are made by the same person who transcribed the original recording. Whenever a part of the conversation, or the saying of a student is omitted from the citation, this is denoted with dots within brackets (...). Dots without brackets indicate either a pause in what was said or an unfinished sentence from the part of the speaker.

The questions of the interviews are presented in Section 3.3.1. However, for the reader's convenience, in the following four Chapters dealing with the presentation of students' ideas, the relative question is cited at the beginning of each Section, on the right side of the text, in italics.

The quantitative data selected were considered not to be parametric ones, because they expressed either dichotomous conditions or rankings of knowledge, beliefs etc. As pertinent the following statistical tests were selected:

1. **Pearson chi-square**: in order to examine the contingency between two dichotomous variables. This statistic is used to test the hypothesis that the row and column variables are independent.
2. **Mann-Whitney U**: in order to compare the mean values of two independent samples. This is the non-parametric equivalent to the t test. It tests whether two independent samples are from the same population. It is more powerful than the median test since it uses the ranks of the cases.
3. **Wilcoxon A:** in order to compare the values of two variables of the same sample. This non-parametric test is used with two related variables to test the hypothesis that

the two variables have the same distribution. It makes no assumptions about the shapes of the distributions of the two variables.

4. **Spearman Rho**: A nonparametric version of the Pearson correlation coefficient, based on the ranks of the data rather than the actual values. It is appropriate for ordinal data and for interval data that do not satisfy the normality assumption.

For the processing of the data two computer packages were used:

1. The QSR NUD.IST, version 3.0.4 for Windows. This package is designed to aid users in handling non-numerical and unstructured data (in this case interviews) in qualitative analysis. NUD.IST does this by supporting processes of indexing, searching and theorizing.
2. SPSS for Windows, renewable version, for the statistical processes.

4.2 Attitudes about health

4.2.1 Value of health and what we should do for it

How important is for you to keep healthy?

The interviewees' **valuing of their own health** was discussed in Q.3. All 40 students acknowledged in one or another way that their health is a valuable asset. Two students however, whilst recognizing the importance of their health, accepted that their practice did not manifest this importance:

> "Em... It's not a main priority of mine, but I think that it should be. I wished I did dedicate more time to my health, but I don't" (B.32, Q.3)

Another student expressed his reservations about the priority of this value over other values:

> "It's quite important but I don't think I would place that as a more than priority in what I'm doing... I mean I know I just have to eat some healthy food but I don't, or you know, I must not eat some things but I still eat it anyway..." (B.35, Q.3)

Finally another student made the distinction between bodily and psychological health and expressed her concern for the second and her disdain for the first:

> "The maintenance of my health with the meaning of (absence of) illness, I would say that it isn't so important, because it is minor, but psychological health is very important. And I always try to strike a balance so as to maintain it." (G.09, Q.3)

What should we do in order to be and keep healthy?

The question about healthy habits (Q.4) preceded any question concerning the way that health is linked to diet. The students were called for an interview about health and healthy habits, without any reference to healthy diet. It is not believed that the tactic of avoiding influencing the students by saying to them that the interview was about healthy diet always worked, because of inter-school contamination (see Section 3.1.4). It is believed, though, that it will have worked in many cases, especially with the first students to be interviewed in each school. This being the case, 38 out of 40 students (95%) declared **good diet** as a prerequisite for good health. The terms by which Greek students refer to good diet varies: "taking care of our diet" (the commonest expression among Greek students), "eating healthily", "the right diet". This terminology varies slightly along British students: "eating the right foods", "eating the proper foods", "having a balanced diet" (very common), "watching at what you eat", "eating wisely", "eating a nutritious diet".

Exercise is the next prerequisite of good health. It is identified by 35 students (88%). The intensiveness of exercise was tackled by some students:

> "I think we should do like a bit of exercise, things like walking to work or school or walking to do shopping, not necessarily going out and doing like running the block jog every night..." (B.21, Q.4)

Some other students, though, argue for more rigorous exercise. One girl gave some good reasons for exercising:

> " I was exercising at one time and I know that exercise helps the body, calms you down, fights the stress. I have been exercising for 5 years in the past and when I stopped I experienced the difference." (G.02, Q.5)

The two students who did not refer to good diet or exercise were all Greek. Other habits contributing to good health were: regular visits to or advice from **doctors** (4 students), **sleeping** enough (3 students), keeping **tidy** (3 students), **wrapping up** (1 student), **relaxing** (1 student) and finally one student referred to the need to **promote the idea** of good health to the whole society and especially among young people:

> "... we should always start with the young people, if you want the general public to be healthy this my opinion you got to like improvise this kind of health issue to... when they're young so they start when, you know, as early as possible, when they understand what are the wrong and what are the differences, you know, what's healthy and what is not healthy for them." (B.35, Q.4)

Ten students (6 Greek, 6 male) spoke about avoiding habits that are detrimental to health. Those habits were: **smoking** (8 students), **drinking alcohol** (5 students), **taking drugs** (6 students), **taking hormones** for boosting athletic performance (1 student) and **casual relationships** (1 student). The Greek students that said we must avoid alcohol abuse were the same ones that spoke about avoiding drug abuse. One of the two British students that referred to drug abuse admitted that she was a regular drug user.

Finally a British student gave an epigrammatic view of healthy habits:

> "Eat wisely and live wisely, have everything in moderation" (B.31, Q.4).

Students' personal values on health and the most commonly mentioned healthy habits are summarized in table 4.

PERSONAL VALUE AND CONSIDERED HEALTHY HABITS	Greek (N = 20)		British (N = 20)		Male (N = 19)		Female (N = 21)		Total (N = 40)	
	No	%	No	%	No	%	No	%	No	%
Health is valued	19	95	17	85	18	95	18	86	36	90
Health is somehow valued	1	5	1	5	1	5	1	5	2	5
Health should be valued	0	0	2	10	0	0	2	10	2	5
Diet prevents health	18	90	20	100	18	95	20	95	38	95
Exercise prevents health	15	75	20	100	16	84	19	90	35	88
Total healthy habits	20	100	20	100	19	100	21	100	40	100
Smoking is bad for health	5	25	3	15	5	26	3	14	8	20
Drugs are bad for health	4	20	2	10	4	21	2	10	6	15
Alcohol is bad for health	4	20	1	5	3	16	2	10	5	13
Total damaging habits	6	30	4	20	6	32	4	19	10	25

TABLE 4: Personal values on health and often mentioned healthy habits. Numbers and percentages represent students.

4.2.2 Appearances and definition of health

Can you imagine somebody whom you think of being healthy? What do you see in him/her that makes you say that? or what do you think makes people healthy?

The appearances of health given by the students fall in four categories: looks, habits, manners and fitness.

For 24 students, of which 14 are Greek and 13 male, external **good looks** reveal health. A nice body is the most frequently mentioned ingredient of good looks by 11 boys and 9 girls. Thirteen students mentioned the skin, usually its colour and the absence of spots. The brightness of the eyes and the absence of black circles were mentioned by another 4 students. A Greek girl epitomized:

> "Usually, when you have health, you have beauty as well. This is how I have combined it." (G.13, Q.1)

Eighteen students (11 Greeks, equal numbers of boys and girls) said that they recognize a healthy person by his/her **manners**: happy, pleasant, lively, active, full of energy. One Greek girl portrayed such a person like that:

> "Health reflects on the personality of a man and on his looks, that is he is fit first of all, this reflects (the fact) that he has psychological euphoria, that is he feels revitalized, he has new powers, he is optimist (i.e.), he is hopeful" (G.04, Q.1)

And another view:

> "Healthy is somebody with harmonious body which is developed by good diet and exercise and he has managed to exercise and eat healthy foods without missing all the other activities of the people of his age..." (G.06, Q.1)

Other good manners included tidiness, well-dressing and smartness, with each of these characteristics mentioned once.

For 16 students (9 British, equal numbers of boys and girls) a healthy person is recognized by his/her **habits**. These habits are exercise (14 students), healthy diet (9 students) and to a lesser degree not smoking and not being on drugs (1 student each). Healthy diet was combined with exercise in 7 out of 9 cases.

Finally, **fitness** is a characteristic of the healthy person for 14 students of which 9 are Greek and 9 female. The definition of fitness varies though:

> "With some muscles, he should basically be an athlete" (G.18, Q.1)
>
> "A healthy person would be somebody, who is fit, when running would not get out of breath" (B.34, Q.1)

For one student health or unhealthiness do not show:

> "You can't really (say)... I suppose you can... in stereotype but if someone is overweight (...), you think that they are obviously unhealthy but always cancer and AIDS and stuff... you can't really tell, I mean a person might look like a supermodel but be dying, you know, you can't really tell ..." (B.29, Q.1)

But even the student who spoke about athletic looks (G.18) had some second thoughts:

> "I think that health does not show externally, it is an internal phenomenon" (G.18, Q.1)

The question of **defining** health came after the question of healthy appearance in order to help students to make the distinction between appearance and real health.

What do you understand by health?

Bodily health was mentioned by 31 students, (78%, 17 British, 16 female). Thirteen of them described it as the absence of illnesses, eleven as physical fitness, three as good functionality of the body and three as the absence of physical disability. Fourteen students though (11 British, 9 female) spoke again about habits: health is adopting healthy habits. In this sample the British students viewed to a greater extent than the Greek students the positive aspect of health, i.e. being able to do things thanks to good health and/or doing things to maintain good health.

Eight students (5 Greek, 6 male) mentioned **mental** health. Five of those students spoke about intellectual culture:

> "...you have to have a healthy mind as well... you have to keep your mind up... activate it...
>
> *How?*

Reading, watching, not watching telly but you know... just I like to... if I'm bored or something after doing something to have a read or... may be turning to a bit of handwork even if I don't want to, just keep my mind going." (B.22, Q.4)

And here is a more political stance:

"As for mental exercise we mean nothing more than reading, and not just this... one should not pathetically accept society, but should rather be a creative person." (G.12, Q.2)

Finally, two students identified mental health with having the right principles in life.

It seems that **psychological** health is a notion familiar mainly to Greek students as it was mentioned by 9 of them (7 female) and by only two of their British counterparts. This may, of course, reflect a linguistic difference of the use of the term "psyche" and its derivatives. As it is, this term seems much more familiar to the Greek students. It was used 26 times as opposed to just one occasion from British students. Two definitions of psychological health were given:

"It's the state ... when he is psychologically well, when he is joyful, happy." (G.02, Q.2)

"the psychological health, when you have developed a good relation with yourself and the others and you have no problems." (G.09, Q.2)

The British students that referred to this aspect of health used terms like "to be happy" (B.40) and "to feel good in yourself" (B.39).

Only one student referred to the **environmental** part of human health and connected it to psychological health:

"We live in cities in a poor environment in a polluted environment. Inhospitable cities that cause problems of bodily and psychological health. That is alienation and loneliness, depersonalization, stress, phobias, insecurities, all those. It (our psychological status) is like the environment" (G.05, Q.6).

Four students spoke about some kind of **balance** in health although they attached three different meanings to it. For the Greek students this balance was rather balance between bodily and mental health:

"It's what the Ancient Greeks have said: A sound mind in a sound body (...) The one cannot exist independently of the other." (G.16, Q.2)

For a British student, though, it was rather the avoidance of over-fitness:

"It's not good to be over healthy as Bruce Lee showed. He was too fit and his heart couldn't take it so dire." (B.26, Q.3)

Finally a girl speculated on the **origins** of health:

"Health is the way that you are and the way that you're making yourself" (B.34, Q.2)

The large majority (95%) of the students stressed or simply spoke about the **positive** aspect of health, and associated it to the feeling of well-being, or the conduct of a healthy life. Good habits are believed to be one of the specific properties of good health (appearances and/or definition) by most of the students. This idea is (almost significantly) more popular among British students (Pearson chi-square = 3.75, p = 0.053). Fitness is the second most often recognized property of good health. No correlation was found between those students who identified health with good habits and those who identified health with fitness.

The **negative** aspect of health was mentioned by exactly half of the students and it was connected with bodily or psycho-mental illnesses, infirmities and conditions. The Greek students and the boys were more sensitive to the negative aspect of health. These differences did not approach statistical significance though. Students' perceptions about health (appearances and/or definition) are summarized in table 5.

PROPERTIES OF HEALTH	Greek (N = 20)		British (N = 20)		Male (N = 19)		Female (N = 21)		Total (N=40)	
	No	%	No	%	No	%	No	%	No	%
Good manners/habits	9	45	15	75	10	53	14	67	24	60
Nice looks	14	70	10	50	13	68	11	52	24	60
Fitness	12	60	10	50	10	53	12	57	22	55
Total positive definition	19	95	19	95	18	95	20	95	38	95
Lack of diseases and disabilities (negative definition)	12	60	8	40	11	58	9	43	20	50

TABLE 5: Definition and/or appearances of health. Numbers and percentages represent students.

4.2.3 Measures of performance

As a measure of the **comprehensiveness of perception of health,** a new variable was developed. This variable reflected the definition of health given in Section 1.2.1 where it was described as having two aspects, positive and negative and as concerning all the parts of human existence, i.e. bodily, mental, psychological, transcendental and environmental. This definition can be represented as a two dimensional matrix, the one dimension representing the positive-negative aspect of health and the other one the parts of the human existence. Consequently the comprehensiveness of each student's perception of health was rated by using the formula:

$$\text{Comprehensiveness} = (Po+Ne) * (Bo+Me+Ps+En)$$

where

Po = 1 whenever the positive aspect of health was given,

Ne = 1 whenever the negative aspect of health was given,

Bo = 1 whenever bodily health was mentioned,

Me = 1 whenever mental health was mentioned,

Ps = 1 whenever psychological health was mentioned and

En = 1 whenever environmental health was mentioned.

According to this formula the maximum points that one student could get was 8 points, corresponding to the most comprehensive definition of health and the lowest 0 corresponding to the narrowest (or lack of) definition of health. For the calculation of the values the answers given in Q.1 (health appearances) and Q.2 (health definition) were taken into account. Only one student who found Q.2 difficult to answer scored zero, while 3 Greek students scored 6, the highest scoring. The mean for the whole sample was 2.63 (Std = 1.51). The male students scored higher than female ones: mean for boys 2.84 vs 2.43 for girls. However this difference was not found to be significant. Greek students scored higher than British ones: means 3.05 and 2.20 respectively. This difference approached significance: Mann-Whitney U = 137, significance = 0.074.

4.3 Ill health

4.3.1 Common and lethal diseases

Which are the most common diseases? (Series 4)
Which are the bodily diseases that most people suffer from? (Series 5)

In the question about the most **common** or **widespread** diseases, twenty eight students (15 Greeks, 16 female) mentioned **cancer**. None of the Greek students named a specific kind of cancer. Six British students, though, named lung cancer:

> "Cancer is what people suffer from, mainly smoking, mainly lung cancer, people... quite a lot of people die every week, I think one or two people a day something die from lung cancer in Britain alone. In the world must be greater, like in America and countries like that, so I reckon lung cancer." (B.30, Q.6)

AIDS was the next most frequently mentioned as common disease: 20 students of whom 15 were Greek and equal number were male and female. Some students may have confused "widespread" with "rapidly spreading" when speaking about AIDS. This is clear in the following dialogue.

> "... AIDS (is) an important disease. Cancer an important disease, widely spread disease.
>
> *-Do you believe that AIDS is one?*
>
> -Yes it is, we have not realized that it is one, it spreads rapidly and a time will come when we will realize it. I think we have 25000 carriers in Greece. This is not a small (number). If we think that a carrier wants to share his/her handicap with another...
>
> *-This is not always true.*
>
> -Yes but in our days sex is everywhere, there is moral depravity, debauchery, young people don't protect themselves and AIDS is easily spreading." (G.05, Q.7)

Cardiovascular diseases were mentioned by 13 students (9 British, 7 male). One of them mentioned atherosclerosis and two others mentioned risk factors like obesity and cholesterolemia (named as cholesterol).

Influenza was mentioned by ten students (7 Greeks, 6 female) and **colds** by eight. **Breathing problems** were mentioned by seven students (6 British). Four of the British students named asthma and two of them bronchitis. **Diabetes** was mentioned by 3 students (2 Greeks) and another 3 students (2 Greeks) referred to "infantile diseases". **Arthritis** was mentioned by two British students. Finally, liver failure, rheumatism, eczema, sinusitis, vitamin B deficiency, tuberculosis, hepatitis, anaemia and mental health problems were mentioned once each.

Of what causes do the most people die in this country? (Series 4)
Which are the diseases that kill most of the people in this country? I.e. the one claiming the greatest number of victims? (Series 5)

Students were then asked to name the diseases that according to their understanding claimed the **greatest number of casualties** in their countries. For 28 students (15 Greeks, 16 female) it was **cancer**. For another 17 students (9 British, 10 female) it was **cardiovascular diseases** - mostly heart disease but also strokes and cerebral palsy. Some students referred to the risk factors for this kind of diseases, namely high blood pressure, obesity and smoking. One student initially could hardly think of diseases as killers:

> "I cannot think of other diseases causing many deaths. Because nowadays there are not many people dying from diseases. Rarely people die from disease. From cancer though yes, many people do. From stroke... and from stroke." (G.09, Q.8)

Twelve students deem that **AIDS** claims a great number of victims (6 Greeks, 7 female). It might be though that this is a surprisingly low number compared to the 20 students that considered AIDS to be a widespread disease. For 4 British (2 male) students, **breathing disorders**, namely asthma or bronchitis, fall in this category too. Two Greek students spoke about "natural death" and a British one about flu. Speaking about lethal diseases sometimes reveals fears:

> "Ebola, its a killer. It appeared in Asia.
> *(And after further explanations about the nature of the question:)*
> From microbes. Those diseases that are spread rapidly and easily, when we are breathing in the same room, you can be infected from someone else's breathing or the saliva, if he sneezes at you and you catch it, or

from insects and animals and we cannot confront them yet." (G.08, Q.8)

Finally, three Greek students spoke about causes of lethal diseases (infections, smoking and obesity) instead of speaking about lethal diseases.

Cross-tabulations 6 - 8 display how likely it was for students who named a disease as widespread to name this same disease as lethal as well. This investigation was confined to the most often mentioned diseases, namely CVD, cancer and AIDS. For AIDS, cross-tabulation Pearson chi-squared = 4.29, p=0.038.

Diseases mentioned as common	CARDIOVASCULAR DIS. mentioned as common lethal			CANCER mentioned as common lethal			AIDS mentioned as common lethal		
	Yes	No	Total	Yes	No	Total	Yes	No	Total
Yes	6	7	13	20	8	28	9	11	20
No	11	16	27	8	4	12	3	17	20
Total	17	23	40	28	12	40	12	28	40

CROSSTABULATIONS 6, 7, 8: Common * Common lethal diseases. Numbers represent students.

4.3.2 Causes of diseases

What causes human diseases? (Series 4)
Do you know what causes those diseases that you named in the previous two questions? (Series 5)

The question about the **causes** of diseases preceded the ones about the different categories of diseases in interviews undertaken in Greece and followed them in interviews undertaken in Britain. This is possibly the reason for which British students made more associations between causes and specific diseases.

For 28 students (18 British, 15 female) diseases are caused by **habits.** These habits are bad diet for 18 of them. All 10 British students who mentioned bad diet associated it with heart diseases. Smoking is another of these habits (17 students). Nine out of the 13 British students that mentioned it associated it with cancer, lung problems or lung cancer. Seven students mentioned **drinking** and another five **stress** and **strain** as bad habits causing illnesses. **Unsafe sex** was mentioned by three British students as causing AIDS, while lack of exercise and bad posture were mentioned once each as causing heart problems and arthritis respectively. There was a marked difference between the percentage of British and Greek students who referred to habits as causes of diseases: 90% vs 50% (Pearson $x^2 = 7.619$, $p = 0.006$). This difference can be attributed, at least partly, to the order of the questions.

Infections were mentioned by 10 students (6 Greek, 5 female). These infections take place through viruses, through microbes or through blood cells. Ten students (7 male, 6 British) reported causes that can be categorized as **environmental**. These causes are: pollution (7), different types of radiation, among which sun radiation (6) and food (non)-availability (1). As for associations, twice radiation was linked to cancer, and once pollution with lung problems. Ten students (7 British, 5 male) spoke about **susceptibility** of three kinds: congenital, hereditary diseases and diseases that are caused by low immunity. The terms that they used for this kind of cause varied. One girl said:

> "We have causes from smoking, from... I don't know, you can just... generally I mean I' m thinking sometimes it's just there in you, like my friend she had cancer, cancer of the knee and it killed her and she was only thirteen... it's very sad." (B.24, Q.8)

Hereditary causes when mentioned were always associated with cancer. Only one student referred to low immunity:

> "It is when your immune system is down it can... when it spreads most, but that's when colds... when you don't eat the right sort of foods your immune system goes down a bit and you get prone to get colds and flus." (B.40, Q.8)

Three students attributed the development of diseases to **chance** (2 Greek, 2 female) either naming it or in an immediate manner by associating the occurrence of diseases with old age. Finally, 11 students (10 Greek, 6 male) consider that **promoters** like ignorance and/or carelessness cause diseases. One of those students associated ignorance with heart disease.

4.3.3 Measures of performance

From the common diseases mentioned by the students the following six are generally accepted by experts as diet-related diseases: some cancers, cardiovascular diseases, diabetes, liver failure, vitamin B deficiency and anaemia. From the lethal diseases mentioned by the students only two were diet-related: cancer and cardiovascular ones. Obesity, which was mentioned by one student as a lethal disease, was also included in the group of diet-related diseases although it is a cause rather than disease. On average each student referred to 1.15 common diseases which are related to diet and 1.15 lethal diseases which are related to diet. However, not all of the students who referred to these diseases named diet as a cause of diseases. There was no significant difference between the average numbers of these diseases for the two nationalities or the two genders.

The **comprehensiveness** of students' thought regarding the factors that affect health was rated by a new variable. According to the Section 1.2.2 the factors that can affect health are: individual lifestyle, environment and inherent factors. Students scored one point for each one of the factors they named. The questions that were mainly taken into account for mapping students' thought were Q.4 for both series of interviews, Q.6 for series 4 and Q.8 for series 5. As all students named habits which promote health, the lowest value of this variable was 1. Twenty six students scored 1, twelve 2 and two scored 3. The means for the male and female students were 1.53 and 1.29 respectively, but this was not a statistically significant difference. However, the difference between British and Greek students was statistically significant: the respective means were 1.60 and 1.20 (Mann-Whitney $U = 136$, $p = 0{,}038$) which means that British students have a more comprehensive understanding of the factors that affect health.

4.4 Discussion

4.4.1 Health with personal reference

From the findings presented in Section 4.2 it becomes evident that for all students health is not only a valuable asset, but an asset that one must preserve and promote too. Even those students that recognized that they do not do enough about their health did not dispute its value. It is noteworthy that some students spontaneously associated everyday practices with the value of health. Thus, they hinted that the valuable things are not such unless we pay a price for them and the price that one has to pay for health is healthy habits.

Apart from the consensus that exists about the value of health, it appears that students also agree on the priority that balanced diet and exercise must have on the pursuit of health. However, this consensus is not extended on the avoidance of abuses. Although all the students admitted that we must do something for our health, only 25% of them mentioned at least one thing that we must not do for the same purpose (table 4). The age of the subjects interviewed is believed to be the age of experimentation. Many students allow themselves to indulge in smoking, drinking or use of substances. In fact, some of them admitted these behaviours. But even they did not dispute the need for restricting these habits. For instance, the student cited below reveals that he has put a limit on his drinking habit. How precise he is in keeping it, and whether he will be able to keep it in some circumstances is another matter; for the time being, as the following conversation reveals, he recognizes that here lurks a danger, which he tries to keep in control.

> "Maybe ... well I have no problem with smoking and I wish I' ll never have, but perhaps sometimes I go out in the night and drink. I don't know. I think this isn't a problem because I don't do it very often, rarely only. Not every Saturday, once every month.
>
> *How much do you drink?*
>
> Say three glasses. Not whisky, I don't like it. Anything else... vodka... three or four glasses, until I start feeling dizzy; just before it, when I start feeling the difference." (G.6, Q.4)

Even a girl who admitted that she did not quite control similar habits did not dispute the need for taking such precautions, nor did she reject the value of health:

> "Em... It's not a main priority of mine, but I think that it should be. I wished I did dedicate more time to my health, but I don't...
> I do exercise occasionally but I also take drugs and drink to excess quite regularly and smoke tobacco." (B.32, Qs 3 & 5)

The only student who did not value bodily health said that she does not adopt healthy habits too.

> "The maintenance of my health with the meaning of (absence of) illness, I would say that it isn't so important, because it is minor, but psychological health is very important...
> As for bodily health I do quite the opposite. Generally I don't take care to protect myself from cold and such things. Quite the opposite things. When the weather is bad I wear summer clothes, I don't know why, I don't feel cold, I don't feel cold weather." (G.9, Qs 3 & 5)

Students' profiles of thought regarding the value of health and the need for adopting appropriate habits in order to protect it, as found in this research, suggest that health education in secondary school is plausible and fits to the students' needs. Moreover, interventions aiming at the change of their health-related behaviours are ethically sanctioned. For some researchers (e.g. Duncan & Cribb 1996) trying to change people's behaviours is not always an ethical intention, especially when these people's values are not compatible with the principles of good health, or when they are incapable of changing them. It is clear that young people who share the values described above and who are willing to promote their health do not fall into this category. The problem, however, is how ethical it is to leave young people who profess that they don't care about their physical health, or those who declare themselves unable to do something to improve it, unaided.

4.4.2 Students perceptions about the nature of health

90% of the students made **positive** associations with health. They either define health or describe healthy looks positively (table 4). Especially in the description of healthy looks, the element of absence of illness or infirmity was mentioned by one student only. The predominance of good health over ill-health in young peoples' thought is not a novel finding. Brannen *et al.* (1994 p. 72) found that 45% of the young people who were asked to define health primarily identified it with fitness and energy, another 20% with healthy lifestyle and only 17% with no illness. If there is something novel in the findings of the present study, it is the relaxed and pluralistic way in which students spoke about this aspect of health, a finding that cannot be manifested through quantitative research, and reveals that students have a sort of familiarity with good health. This familiarity was found even among the students who admitted having a severe health problem[1], a finding that points directly to Schaefer's perception of health according to which "health is the successful reaction to disturbance" (Section 1.2.1). It would not be an exaggeration to suggest that this mental familiarity with good health reveals potentially healthy persons. Brannen *et al.* (1994, p. 80) suggest that fitness as a definition of health is more associated with male young people whereas healthy lifestyles and absence of illness is more associated with girls. Similar conclusions cannot be drawn from the present study where the numbers of boys and girls who mentioned those aspects of health were comparable (table 5).

The descriptions of good health given by the students were in fact either the **means** or the **end** of it (table 5): Healthy habits represented the means, and perfect functionality and general fitness the end. In other words, students see health as a conduct of life and/or as the (eventual) fulfillment of their potential. Only two students shared both these viewpoints, i.e. the way of life and the achievement of well-being in regard to the body. This connection was made slightly more often in the psycho-mental domain though. From the relatively fewer (11) students that referred to it, three of them combined the means with the end. So students are divided in three groups: those that associated health with a good conduct of life, those that saw good health as a desirable state and a smaller group that combined the state with the way to achieve it. Probably the students from the first two groups have developed an elliptical perception of health. So, the stance of the first group may in fact conceal a mentality

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[1]The illnesses reported were: Turner's syndrome, optic problems, leukemia, heart disease and asthma

which in Section 2.2.3 was described as internal Health Locus of Control, while the stance of the second group might, in extremis, conceal people of external HLC. The data elicited on this matter are not enough for generalizations. It is important however for health education to foster the means towards the state of health and to elucidate this state. In this way extreme positionings on the HLC continuum might be challenged.

Only half of the students who were asked in the present study to give a definition of health spoke about diseases and disabilities. This relatively low percentage may pertain to their age. Most young people were healthy and their experiences of ill health may have been transient and not as grave as to help them realize the natural limits of health. But even those five students that admitted who had experienced a severe health problem (see previous footnote) did not refer to illnesses when asked to define health, except for one of them. The relatively low percentage of students who define health in terms of the avoidance of preventable diseases may be another point of concern for health education. For students who do not foresee the possibility of health adversity, prevention might be irrelevant.

The students' perceptions about health is restricted from another point of view. They do not associate health with their social or natural environment unless they refer to illnesses. Just one student spoke about the effects that inner city life can have on psycho-mental health (see Section 4.2.2). Another study, however, that investigated health beliefs in adolescence through questionnaires (Head 1987) showed that over 60% of the respondents considered "having good friends" and "being liked by people" as healthy things. One can suggest that although adolescents agree that being sociable is healthy when they are told so, they do not make this association spontaneously.

The most common pattern of definition of health was found in the present study to be the "positive * bodily" health which was shared by 14 students: 11 British and 9 female. The second most common was the "positive + negative * bodily + psycho-mental" health shared by 9 students: 7 Greeks and 5 male. The model of health emerging here could be called "the health of the ego" because, as mentioned in the previous paragraph, it does not take into account the existing two way interactions among humans nor between humans and their physical and social environments. It looks as if students (except the case G.09 mentioned in Section 4.2.2) can imagine humans being well without having established harmonious relationships among themselves or with their habitat. In fact, the quality of those relationships strongly influences both present health and the long-term sustenance of it.

4.4.3 Students' perceptions about the nature of ill-health

The subjects of the present study appear to believe that cancer, AIDS and cardiovascular diseases are the most common diseases and cause the greatest number of casualties in their countries. Cancer is for both the Greek and the British samples the most often mentioned disease. According to WHO statistics (WHO 1996) this is the second most common cause of death. The first cause is the group of diseases of the circulatory system. However, fewer than half of the students, both Greek and British, recognize cardiovascular diseases as being either common or a common cause of death. AIDS on the other hand, is believed to be a common disease by half of the students and common cause of death by one in three. In fact, according to WHO (1996) all the viral diseases taken together do not cause more than 0.8 and 0.5 deaths per 100,000 population in the U.K. and in Greece respectively. This emphasis on AIDS from the part of the students may be the result of the great publicity given to this disease in order to prevent its spreading. This publicity may have caused, though, a gross misinterpretation of its present abundance.

The relatively low mention of cardiovascular diseases can only be attributed to lack of information. As the rates of diseases fluctuate, public updating tends to focus more on the "rising" diseases than on the "subsiding" ones, even if the second are still the more wide spread ones. Cancer and AIDS appear to have been in the limelight for some years now as the rates of both are increasing (for cancer rates see HEA 1990, p. 4). This probably increases the feelings of personal vulnerability among the public. In Brannen *et al.* (1994 p.73) when young people were asked which were the most worrying things about the future 29% of females and 33% of males mentioned AIDS. Cancer was mentioned by 14% and 26% and heart attack by 9 and 3% of females and males respectively.

Thus, the findings of both studies suggest that students are more apprehensive about a disease for which today's statistics are not very bleak and from which they can certainly protect themselves, namely AIDS, whilst they do not feel equally apprehensive about the most lethal disease in our society, i.e. heart attack, from which they can only partly protect themselves through their lifestyle.

The feeling that one gets from these findings is that there exists a gap of information on the incidence of diseases. Although it is not suggested here that statistics of epidemiology should be introduced in education as such, the prevalence of the most common diseases should be a subject of information.

As for the causes of diseases, all students acknowledged that lifestyle or habits affect health. The most commonly referred causes of diseases were attributed to behaviours, be they bad diet, abuses or lack of protection against infections. The environmental causes of diseases was obvious to one out of four students only. An equally low proportion of students spoke about the inherent factors that determine our health. So most students tend to downgrade those of the health factors over which they have little control. This interpretation is in harmony with the perception which was earlier called "the health of the ego".

The extreme expression of that perception is that good health can be sustained amidst a hostile environment and regardless of the genetic endowment of the individuals. The students of the present study have not explicitly taken that extreme position but the failure of as many as 3 out of 4 of them to mention either the environmental factors or the inherent ones means that they would probably adopt the same practices as those people that take this position. Those practices might be:

1. Disregard of their family's medical record and the consequences that this may have for their susceptibility to certain medical conditions.
2. Acting individually only to bring about health and ignoring the benefits accruing from campaigning for social health promotion and an unpolluted environment.

Comparing the means of variables regarding the comprehensiveness of perception of health (Section 4.2.3) and the comprehensiveness regarding the factors that can affect health (Section 4.3.3) it appears that Greek students have a wider conception of health but that British students can identify more of the factors that affect health, especially physical health. These outcomes cannot be fully attributed to the different educational approaches on health issues. Health Education in British schools is a wide issue that allows for the environmental and psychological aspects of health to be introduced in the classroom (National Curriculum Council 1990), whereas there is no structured policy embedded in the course of Greek secondary syllabus which could be named as health education at all. Some rudiments only of hygiene are found in Anthropology. The obvious hypothesis that British students would have a more inclusive perception of health was not confirmed. The fact that British students are more articulate in identifying the general factors affecting health, though, might reflect the stronger presence of Health Education in British schools. So, if the particular findings reflect the content of Health Education in schools (which may in fact not be the case), one would suggest that where the factors of health are dealt to a greater extent, the meaning of health per se eludes the attention which thus becomes more elliptical.

In fact in Section 1.6.3 it was suggested that although the British and the Greek syllabuses deal with health-related matters, they do not address health as a whole and that this omission could result in an elliptic understanding of health by young adults. This hypothesis was confirmed to some extent. Most of the students interviewed had a narrow understanding of health, mainly limited to bodily health, and did not recognize the whole range of factors that may affect it. Many students also appear not to be well informed about the incidence and importance of common diseases.

4.5 Conclusion

Summing up, the findings presented in this Chapter suggest that:

1. Almost all students value health and believe that for health's sake one should tune his/her behaviours accordingly. This belief is independent of their own commitment to a healthy life.
2. All students mentioned the positive aspect of health. Only half of them spoke spontaneously about the avoidance of ill-health.

3. Health concerns the bodily and for some students the psycho-mental parts of the human. Environmental or transcendental health are usually not mentioned.
4. Most students did not have a long term view of health: for them health is either a way of life or a state. Those two were seldom causally connected.
5. 90% of the students recognize cancer as a common disease or as a frequent cause of death, while cardiovascular diseases and AIDS are recognized as such by significantly fewer students. As for the causes of pathology, most students refer to habits, whereas heredity and environment are scarcely mentioned.

In the light of this evidence **nutrition education**, as part of health education, is sanctioned as ethically correct and relevant to students' perception about health. Some emphasis should be put on the following points:

1. Introduction or expansion of those interventions that aim at the dissemination of healthy eating habits. The objectives of these interventions should be crystal clear, even when they are positioned in the remote future. The consensus for such interventions seems to exist from the views of the students.
2. Addressing the meaning of health per se and discussing it from both its socio-economic and humanistic points of view. In harmony with this perspective, nutrition education should not only refer to the physiological effects that a balanced diet has on humans, but should encompass psychological, environmental, social and economic aspects.
3. Addressing the meaning of ill-health: causes of diseases, basic statistics of today's illnesses.

The concept of the "health of the ego" could be further **researched**. It is interesting to see to what extent and how many young people understand health as an affair of the individual, namely, whether health is tantamount to personal health and whether health results from personal actions only.

Chapter 5: UNDERSTANDING OF HEALTHY DIET

5.1 Introduction

The role of **knowledge** for the adoption of a behaviour was discussed in the second Chapter. Knowledge was described as the necessary but not always sufficient prerequisite for the onset of the process which will end up in this adoption. Social Cognitive Theory (SCT) and Diffusion of Innovations Theory (DOIT) deal with knowledge extensively. For Health Belief Model (HBM) and Theory of Reasoned Action (TORA) the role of knowledge is implied but not explained. All those theories agree that for an individual to start thinking seriously of adopting a behaviour, he/she must believe in some outcomes resulting from this behaviour which (outcomes) he/she appreciates. SCT posits that valuing the expectations of one behaviour constitutes an intrinsic reinforcement for it. DOIT resonates the same meaning saying that the decision for the adoption of an innovation depends on compatibility with values and needs of the adopters. The stances of the other two theories on the necessity of rating the behaviour as effective and useful are almost identical.

This Chapter presents the content of knowledge and beliefs that the students entertain on the issue of healthy diet. These beliefs are then contrasted to their perceptions about health in order to examine how valuable the supposed outcomes of this diet are for them. Their perception about health was analyzed in Chapter 4. Using the outcomes of this analysis it will be easier to pinpoint to what degree the specific actions (the described as healthy eating patterns) correspond to the targets set earlier (the components of health). This correspondence according to TORA is a quite important factor, for the formation of positive intention to adopt the specific behaviour.

So this Chapter will attempt to answer to three questions:

1. What do students understand as healthy diet?
2. How sound is their understanding?

3. How does their understanding match their perception about health?
4. How do the ideas of British and Greek or male and female students compare?

Our understanding of healthy diet consists of **knowledge and beliefs**. These two terms are used to describe the two poles of a continuum. The pole of knowledge holds all those "specific facts" (compare Krathwohl and Bloom 1959, p. 66) described as the basic ontology of a discipline. In the case of nutrition this ontology includes nutrients, foods etc. As we stray from this end, knowledge becomes more composite, very specific entities and laws appear and jargon sets in. This knowledge is partly only comprehended by most people. They accept it as valid, though, because they trust the authority of the discipline. In other words, the acceptance of this knowledge is partly an act of belief. In the case of nutrition such knowledge may be the physiological effects of eating sugar, without understanding the details of insulin levels, or the building of atheroma, without understanding the role of oxidized cholesterol. In fact, for most people this knowledge involves a good deal of belief. Further along the continuum we maintain ideas about healthy diet although we are not able fully to support it on evidence or to prove it on a purely logical basis. These ideas are beliefs although they may be based on valid knowledge. For instance, in these days many people support the notion that CJD in humans and BSE in cows are related, although till now (January 2001) there is no conclusive scientific evidence for this. To this their belief may have contributed knowledge of raw statistics concerning the two diseases, contradicting hypotheses propounded by members of the scientific community and personal values like vegetarianism, animals' rights etc. Such ideas possess the other pole of the continuum, the pole of beliefs.

It is obviously difficult to discriminate absolutely between knowledge and beliefs, because, especially with lay people, these two notions are interweaved. For the purpose of this study, the students' sayings about the composition of food were categorized as knowledge. Their ideas about the physiology of the nutrients, although this incorporates a great deal of knowledge, was categorized as beliefs because a student of this stage is not expected to be able to demonstrate the causative relationship between diet and its physiological effects. Ideas of physiology expressed by a secondary school student reveals trust in the discipline's authority. For this reason it was labeled as belief. Students' more general ideas about the characteristics of healthy diet were also categorized as beliefs.

The presentation of the students' views on healthy diet follows the scheme 'from the general to the specific'. So their beliefs are described in Section 5.2, whereas their knowledge is described in Section 5.3.

The methods of analysis and the way of presentation of the findings are those followed in Chapter 4. These methods and ways of presentation appear in Section 4.1.

5.2 Beliefs about healthy diet

5.2.1. General characteristics of healthy diet

Do you believe that there are such things as healthy or unhealthy diets?
How are they?
or (if the student had in previous questions expressed the view that health is promoted by diet)
Can you describe to me what you think to be healthy eating?

Among the **general beliefs** the one about **variety** was shared by the relatively greater number of students: 14 students of which 9 were British and 8 female. Variety was sometimes described within groups of foods (i.e. eat all types of meats) or across the different groups of foods. It was also defined using either nutrients or foods. These are two characteristic examples:

> "Veg., fruits and meat because it contains proteins which are very important for our constitution but not in large quantities and not just one kind, combining all of them." (G.01, Q.12)
>
> "A healthy diet is having a balanced diet.
>
> -*What do you mean by that?*
>
> -I mean like having the proper amount of carbohydrates, proteins, vitamins, minerals... and the other food groups which I can't remember." (B.24, Q.15)

Eleven students mentioned **moderation** (9 Greek, 7 male). **Proportionality** was mentioned by 7 students (5 Greek, 4 female). The expressions students used for proportionality differed: "eat basically this or that...", "we should eat... we should avoid", "we should avoid... and we should favour..." "not to eat... and eat a lot...".

The **cooking method** was mentioned by 10 students (7 Greek, 9 female). In most cases it was supported that we should avoid fried foods in favour of boiled or baked or steamed ones in order to avoid fat. However a Greek girl gave an alternative view:

> "*-Why do you think that steamed foods are healthier.*
>
> -Because some of their constituents are eliminated, let us say that the more harming constituents go.
>
> *-Do you believe that the same thing happens with baking?*
>
> -Yes.
>
> *-What's happening with frying?*
>
> -I don't believe that those constituents go, they remain." (G.14, Q.13)

Seven students (5 British and 5 female) said that we must avoid **junk food** or **foods in packets.** They reasoned their view in terms of lack of freshness, fatty ingredients and lack of transparency in ingredients.

Five Greek students (3 male) spoke about the need to take different foods in the correct **combination**:

> "The combination of some foods like eating fish and then egg, gives trouble to the stomach." (G.18, Q.14)

One British student though gave an example of combining nutrients:

> "When you have iron, you need vitamin C to absorb it..." (B.40, Q.14)

Seven students (6 British, 5 male) expressed the view that we must take care of the **timing** of our eating, five of them saying that we must have 3 or 4 **proper lunches** and avoid snacking. Four students said that food must be **easily digestible** in order to be healthy and four Greeks expressed their preference for **pure** foods. Purity was identified with the lack of chemicals like pesticides and with simple processing. One student gave a very bleak image of the foods:

> "I basically believe that there is nothing healthy. There is nothing today that's healthy. You heard about all those incidents with the lambs, with the sheep, the mad cows, which (things) do not happen just with the

animals but with plants as well, they are heaped with different harmful pesticides..." (G.17, Q.12)

Another 3 students raised the issue of **freshness** of foods. Two Greek students seem to believe that **vegetarianism** is a good thing for you, one of them speaking about strict vegetarianism and finally one Greek student supported the idea of eating slowly in order to digest all the nutrients.

5.2.2 Specific beliefs about foods and nutrients

Why do you think that this is healthy diet? (Series 4 & 5) This question, in some cases was more specific depending on what the student had said in the previous questions e.g.:
Why should we eat much cereals? or
Why should we eat often?
In what way do you believe that food or nutrient a or b affects our health?
Can you describe to me any way or mechanism that diet affects health? (Ser. 4)

The **specific** beliefs are categorized as either correct or trivial. For a specific belief to be categorized as **correct** it has to describe both the action to be taken and the exact target of it. For instance: "Milk is necessary for bone growth". **Trivial** beliefs are those according to which either action and/or target are not specified or when the action described has a marginal or, in a very small number of cases, none effect on the assumed target. For instance: "Bread makes you fat" is a trivial belief, since the action is not well described, since bread is fattening whenever eaten with fatty sauces or in excess. Table 9 summarizes the beliefs about foods and table 10 the beliefs about nutrients.

Comparing the data in tables 9 and 10 it becomes obvious that students are speaking more often about nutrients than about foods. They have made 90 statements regarding nutrients and only 31 regarding foods. Furthermore 23 students (58%) did not refer to foods vs 7 only (18%) who did not refer to nutrients. On average each student made 0.78 statements about foods and 2.25 about nutrients.

Another general feature is that students' beliefs concerning nutrients are more likely to be precise than their beliefs concerning foods. 84% of the statements about nutrients were correct versus 48 % of the statements about foods. In statistical terms, the mean ratio of correct over all beliefs about foods was 0.45, whereas for nutrients the same ratio was 0.84 (Wilcoxon signed ranks test Z = 2.14, 2-tailed significance = 0.033). The beliefs about the side effects of eating too much fat have contributed to the higher accuracy of beliefs about nutrients to a great extent. British students expressed more beliefs about nutrients than Greek students (respective means 2.80 vs 1.70, Mann-Whitney U=139, Significance = 0.092). On the other hand Greek students exceeded the British ones in beliefs about foods (respective means 0.90 vs 0.45, Mann-Whitney U=157, Sign. = 0.192). Male and female students expressed similar numbers of beliefs about nutrients and foods.

	FOOD TO GO FOR	TARGET	FOOD TO AVOID	TARGET
CORRECT	Enough food	Increases immunocompetency (1)	Excess of food	Obesity (4)
	Fruits and vegetables	Not fattening (1)	Sweets	Diabetes (1)
		Clear digestive tract (1)		Obesity (1)
	Potatoes	Provide energy (2)		
	Dairy foods	Health of bones (3)		
		Growth (1)		
TRIVIAL	Vegetables	Are good for you (3)	Excess of food	Constipation (1)
	Cereals	Are good for you (2)	Bread	Obesity (1)
			Meat	Indigestion (1)
				Cardiovascular disease (1)
				Obesity (1)
			Chips	Sickening (1)
			Chocolate	Bad for you (2)
			Coffee	Bad for you (1)
			Ketchup	Bad for you (1)
			Spices	Heart disease (1)

TABLE 9: Beliefs about foods: actions and targets. Numbers of students appear in brackets.

	NUTRIENT TO GO FOR	TARGET	NUTRIENT TO AVOID	TARGET
	Vitamins	Growth (4)		
		Health of bones (3)	Excess of fat	Cardiovascular diseases
		Health of skin (1)		(19)
		Health of blood (1)		Obesity (11)
C	Calcium	Health of bones (3)	Cholesterol	Heart disease (3)
O		Health of teeth (1)		
R		Growth (1)		
R	Iron	Avoid anaemia (2)	Sugar	Obesity (1)
E				Dental caries (1)
C	Minerals	Growth (1)	Excess of salt	Heart disease (3)
T	(general)			
	Starch/	Provide energy (7)		
	carbohydrates			
	Fibre	Clearing of intestines (3)		
		Avoid cancer of intestines (1)		
	Proteins	Growth (4)		
		Provide energy (1)		
		Cell repair (3)		
	Water	Blood cleansing (1)		
		Hydration (1)		
T	Vitamins	Blood cleansing (1)	Excess of fat	Stomach diseases (1)
R		Stomach functioning (1)		Liver diseases (1)
I				Skin spots (1)
V	Starch/	Are good for you (3)	Excess of	Constipation (1)
I	carbohydrates	Build muscles (1)	fibre	
A	Protein	Makes you fit (2)	Excess of salt	Gallstones (1)
L	Fat	Thermal insulation (1)		

TABLE 10: Beliefs about nutrients: actions and targets. Numbers of students appear in brackets. For the purposes of the analysis water is included in nutrients.

5.2.3 Misconceptions about the physiology of diet

Generally speaking, the students did not reveal many misconceptions about the physiology of food. Most misconceptions were mentioned by only one student. This is a list of the misconceptions met, with the number of students holding them appearing in brackets.

1. Fat is hard to digest (3):

> "*-Why should we avoid fats?*
>
> -We should avoid them yes, because fats are more hard to digest..."
>
> (B.34, Q.15)

2. Fat is not nutritious (2):

“ I don’t like eating things like casseroles and things like that, they are very fatty, high in fat and is not really, to me is not very nutritious.” (B.35, Q.12)

“*Does fat have energy*?

Fat? No it doesn’t. It’s ... not as far as I know. I don’t think it does. Things like butter and lard, they don’t have energy.” (B.37, Q.22)

3. Dietary fat is necessary for growing fatty body tissue (1):

“... you cannot live without fat because in this country especially we have cold winters and fat is good for insulation” (B.25, Q.14).

4. We need dietary cholesterol (1):

“... they must eat foods as meat in order to take some cholesterol, because they need it” (G.09, Q.18).

5. We should prefer saturated fats than unsaturated (1):

“Saturated fats actually are better for you than unsaturated. The saturated have one bond between the carbon atoms of the fat molecules...” (B.30, Q.18)

6. Intakes of saturated fatty acids are necessary (1).

“saturate fatty acids are necessary for the body, the body’s intakes, so... not really avoid them but not eating much of them...” (B.25, Q.19)

7. Saturated fat contains more fat than unsaturated fat (1):

“Obviously saturated fat yes has got more fat because it tells you not to have so much...” (B.25, Q.19)

8. Red meats differ in protein compared to white meats (1):

“Er... maybe to prefer white meats to red meats er...

-Do you know why?

.... Yes they are high in protein so...” (B.21, Q.20)

9. We must eat all nutrients in equal proportions (2):

“...make sure you have a balanced diet, not just concentrate on one particular food group which would be like carbohydrates, because to live you have to have all three balanced. I mean you cannot eat one thing more than the other because that will cause you problem..." (B.25, Q.14)

When challenged though this idea may subside:

"Many people have different opinions of healthy diets, but I just think that it's all at the seven different groups of food: carbohydrates, proteins, fats, vitamins... as long as you get an intake of equal amount of all of them, I think that's healthy.

-An equal?

-Yes.. Or not equal, I mean as long as you are getting some of them not just concentrating on one or two and not taking no carbohydrates and proteins..." (B.28, Q.14)

10. Diabetics need great amounts of sugar intakes:

"If you've got diabetes sugar obviously, you'd have to have a great intake of anything of sugar like chocolate etc, artificial sweeteners etc..." (B.25, Q.20)

Regarding misconception no 1 it is mentioned that fat is difficult to digest by some people due to pathologic or other reasons, e.g. removal of the bile. The students that believed that fat is generally difficult to digest may have had in mind a similar case from their home.

Misconceptions nos 7 and 8 appear to be generated by the same mechanism, namely the need for making sense of an incoming information (here a recommendation) through consolidated (but insufficient, or irrelevant) knowledge. In these cases the incoming information are: "prefer white meat instead of red meat" and "prefer unsaturated to saturated fat" and the available knowledge associated with these recommendations is: "reduce the protein/fat intakes". The necessary combination of two may lead to the beliefs 7 and 8.

5.2.4 Grouping of targets and actions of diet and relation to understanding of health

In order to have a more rounded picture of the **targets** of the students' versions of balanced diet, the specific targets named by them were grouped as follows:

1. For 29 students looking, feeling and performing **well** is one of the targets of good diet. Weight control (19 students, 10 Greek, 11 male), energy provision (9 students, 7 British, 5 male), growth (8 students, genders and nationalities represented in equal numbers), skin health (2 students), fitness (2 students), thermal insulation (1 student), high immunity (1 student), smooth digestion (1 student) and avoidance of sickening (1 student) were the specific targets that were grouped together in this category.
2. For 11 students the **functioning** of the different organs are matters that can be managed by good food. Cell repair, blood health, normal bowel movement, hydration, strong bones and teeth were the specific targets that contributed to this category.
3. Avoiding the **scourges**[1]. Twenty four students mentioned illnesses. Twenty three of them associate diet with cardiovascular diseases, only one with cancer, another with diabetes, one with gallstones, one with stomach disorders and one with liver failure.
4. Only 10 students used statements with **unspecified** targets.

The numbers of students and beliefs that have referred to these groups of targets are analyzed in table 11. A possible (but with low statistical significance) difference appears between male and female students regarding the mentioning of good-health targets. On average each boy mentioned 1.42 such targets versus 1.05 mentioned by each girl.

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[1]The term "scourges" is borrowed by a Greek student who used the Greek word "μάστιγες" in order to characterize AIDS and cancer.

GENERAL CATEGORIES OF TARGETS		GREEK N=20	BRITISH N=20	MALE N=19	FEMALE N=21	TOTAL N=40
1.LOOKING, FEELING, PER-FORMING WELL	Nos of students	14	15	16	13	29
	Nos of beliefs	23	26	27	22	49
	Beliefs/student	1.15	1.30	1.42	1.05	1.23
	Mann-Whitney U, p	190, 0.77		157, 0.23		
2. GOOD BODILY FUNCTION	Nos of students	6	8	8	6	16
	Nos of beliefs	10	14	14	10	24
	Beliefs/student	0.50	0.70	0.74	0.48	0.60
	Mann-Whitney U, p	181, 0.54		174, 0.41		
3. AVOIDING THE SCOURGES	Nos of students	13	11	12	12	24
	Nos of beliefs	18	15	16	17	33
	Beliefs/student	0.90	0.75	0.84	0.81	0.82
	Mann-Whitney U, p	183, 0.61		188, 0.74		
4. UN-SPECIFIED	Nos of students	4	6	4	6	10
	Nos of beliefs	5	7	5	7	12
	Beliefs/student	0.25	0.35	0.26	0.33	0.30
	Mann-Whitney U, p	181, 0.50		186, 0.62		

TABLE 11: Targets of healthy diet: Beliefs/student are calculated by dividing the number of beliefs by the corresponding number of the sample. No significant differences were found between the subgroups.

The most common negative target, i.e. disease prevention, was the avoidance of cardiovascular diseases. In crosstabulations 12 - 15 the mentioning of cardiovascular disease (CVD) as common, or as a common cause of death or as both (see Section 4.3.1) is collated with the mentioning of targeting CVD through diet. The figures of these crosstabulations are discussed in Section 5.5.1.2.

Target of diet: avoiding cardiovascular diseases	CVD mentioned as common		CVD mentioned as a common cause of death		CVD mentioned as common and as a common cause of death		CVD mentioned as either common or as a common cause of death		Total
	yes	no	yes	no	yes	no	yes	no	
Mentioned	9	14	11	12	5	18	15	8	23
Not mentioned	4	13	6	11	1	16	9	8	17
Total	13	27	17	23	6	34	24	16	40
Pearson x^2	1.09		0.63		1.93		0.61		
Significance	0.30		0.43		0.17		0.43		

CROSSTABULATIONS 12 - 15: Students that consider cardiovascular diseases as common * Students that mentioned targets of healthy diet related to cardiovascular diseases

In order to find out if any association existed between the different targets (looking, feeling, performing well [1], good bodily function [2] and avoiding the scourges [3]) three bivariate correlations were carried out among the three variables representing the number of beliefs that each student entertained in each group of targets. It was found that a significant correlation existed between the beliefs about bodily function and those described as "looking, feeling and performing well". (Spearman's Rho = 0.396, $p = 0.012$).

The **actions** that, according to the subjects of the present study, should be taken for implementing a healthy diet are of three distinctive profiles:

1. Selectivity: It was expressed as specific beliefs about foods and nutrients, variety, combination, vegetarianism and digestibility depending on the food ingredients.
2. Self-restraint: It was expressed as proportionality, moderation, having meals instead of snacking, slow eating and the specific beliefs that expressed moderate intakes of sweets, chocolates, chips, fat and salt (the most difficult to cut down on). The specific beliefs about sweets, chocolates, chips, fat and salt were also included in the selectivity profile.
3. Quality of food and processing: It was expressed as the right cooking method, avoiding junk food, ensuring purity and freshness of food and digestibility depending on cooking method.

Table 16 summarizes the findings of this categorization. The most often mentioned actions of good diet had to do with selectivity. The next most often mentioned actions were those of self restraint. The quality of food was the less often expressed concern. It appears that food quality is more of a concern for Greek and female students. The female group expressed far more beliefs on the quality of food and food processing than the male group did (Mann Whitney $U = 110$, $p = 0.006$).

Finally, it was examined whether the students' understanding of health (see Section 4.2.2) and the explicated targets of healthy diet were compatible. Crosstabulations 17 -19 represent this correspondence. Only negative definition of health and negative targets of health may have some kind of positive association. For the rest of the crosstabulations one cannot draw secure statistical indicators as they contain cells counting less than 5.

	SELECTIVITY				FOOD & PROCESSING QUALITY				SELF-RESTRAINT				TOTALS	
	Students	Actions	Mean	U, p	Students	Actions	Mean	U, p	Students	Actions	Mean	U, p.	Actions	Mean
G (20)	20	66	3.30	185	11	15	0.75	155	18	38	1.90	166	97	4.85
B (20)	18	77	3.85	0.68	6	10	0.50	0.17	14	32	1.60	0.34	96	4.80
M (19)	17	70	3.68	194	4	4	0.21	110	16	37	1.95	184	90	4.74
F (21)	21	73	3.48	0.87	13	21	1.00	0.01	16	33	1.57	0.66	103	4.90
T (40)	38	143	3.57		17	25	0.62		32	70	1.75		193	4.83

TABLE 16: Profiles of actions for a healthy diet across the subgroups of the sample. Means represent actions per student of the corresponding sample. G = Greeks, B = British, M = male, F = female, T = totals.

Positive definition of health	Positive targets of healthy diet			Negative definition of health	Negative targets of healthy diet			Functional definition of health	Functional targets of healthy diet		
	yes	no	total		yes	no	total		yes	no	total
yes	27	11	38	yes	14	6	20	yes	2	1	3
no	2	0	2	no	10	10	20	no	13	24	37
total	29	11	40	total	24	16	40	total	15	25	40
Pearson		0.799		Pearson		1.667		Pearson		1.177	
x^2, p		0.372		x^2, p		0.197		x^2, p		0.278	

CROSSTABULATIONS 17, 18 & 19: Understanding of health * Targets of healthy diet. Numbers represent students.

5.3 Knowledge about food composition

The statements made by the students, which involved food composition, are classified in three categories: correct, imprecise and misconceptions. For a statement to be correct it must refer to a certain nutrient and a certain food or group of foods which (food or group of foods) are basic providers of this nutrient, e.g. "pasta contains starch". Whenever the food contains the nutrient in such a proportion that cannot be deemed as basic

The interviewer did not address any questions having to do with the composition of foods. However, in the course of the interviews the students reasoned their beliefs concerning the nature of healthy diet in the composition of foods, or spoke straightaway about the physiology of nutrients (Qs 12-14 in series 4, Qs 14-15 in series 5). In the last case the interviewer asked them where the relative nutrients were to be found. Other questions that prompted the students to speak about the composition of foods were the two exercises (Qs 17-24 in series 4, Qs 18-26 in series 5).

provider of this nutrient or whenever in the group of foods referred there are foods that are and others that are not basic providers of the nutrient, the statement is classified as imprecise. An example of the first case is: "milk contains iron" and of the second: "vegetables contain carbohydrates" (what type of carbohydrates and what type of vegetables?). Finally as misconceptions are characterized those statements that assumed a content of a nutrient in a food or group of foods that does not exist. Only one misconception was found. The correct statements made by the students are summarized in table 20 and the imprecise ones in table 21. Table 22 sums up the number of statements made for each group of nutrients. The number and percentages of students that mentioned each nutrient (accurately or not) are summarized in table 23.

The only statistically significant differences between the subgroups of the total sample were the following:

1. British students mentioned correctly much more often the fibre content of foods than Greek students).
2. British students mentioned correctly much more often the protein content of foods than Greek students.
3. Male students mentioned correctly much more often the lipid content of foods than female students.
4. Male students made more imprecise statements about the protein content of foods than female students.

Lipids were mentioned quite a few times though nobody related unsaturated fatty acids to oils and saturated fatty acids to animal fats. Consequently nobody mentioned trans-fatty acids either. On aggregate per person there were made 0.425 statements concerning the lipid content of foods compared to 1.70 statements concerning the starchy and sugary content of foods and 0.60 statements concerning the content of fibre in foods. Protein statements fared better than lipids but worse than carbohydrates: 0.825 statements per person. Vitamins were mentioned slightly more often than proteins. It is worth mentioning here that vitamins (and metals) did not feature in the "WHO table". In fact, students spoke about vitamin content of foods usually in other questions than Q.18 of series 4 or Q.20 of series 5.

NUTRIENT	FOOD	CONTENT OF NUTRIENT IN 100 G	STUDENTS				
			G	B	M	F	Total
STARCH	Starchy sector	6-77 g	2	1	1	2	3
	Bread	34-45 g	12	2	6	8	14
	Potatoes	15-44 g	11	10	12	9	21
	Cereals	38-77 g	2	2	2	2	4
	Pasta	21 g	3	6	3	6	9
	Rice	31 g	1	3	1	3	4
	Legumes	6-15 g	1		1		1
SUGARS	Fruits	3-37 g		1	1		1
	Sweets	8-48 g	1			1	1
	Chocolate	57 g	1	1	1	1	2
FIBRE	F & V sector	1-13 g		1		1	1
	Vegetables	1-6 g	4	3	2	5	7
	Fruits	1-6 g	1	3	1	3	4
	Cereals	1-13 g		5	3	2	5
	Potatoes	1-2 g		1	1		1
	Soya			1	1		1
	Bread	2-4 g		3	2	1	3
	Brown pasta			1	1		1
	Brown rice	1 g		1	1		1
PROTEIN	Eggs	13-14 g	1		1		1
	Fishes	15-24 g	2	1	1	2	3
	Meat	16-32 g	4	11	8	7	15
	Milk	3 g		1	1		1
	Legumes	5-8 g		6	5	1	6
	Cereals	8-11 g		1		1	1
	Rice	3 g		1		1	1
	Bread	8-9 g		1		1	1
	Cheese	14-26 g		1		1	1
FAT	Meat	5-18 g	1	1	2		2
	Potato crisps	38 g		1		1	1
	Cakes & pud's	3-17 g		1		1	1
	Bacon	34-41 g		1	1		1
	Eggs	11-14 g		1	1		1
	Cheese	4-34 g		1	1		1
CHOLESTEROL	Meat	100 mg	2	2	4		4
	1 egg	200 mg	2	1	3		3
SALT	Potato crisps	3 g		1	1		1
VITAMINS	Vegetables	several	8	7	5	10	15
	Fruits	several	8	5	5	8	13
	Meat	group B	2		1	1	2
	Milk	A	1	1	2		2
	Cereals	group B	1			1	1
IRON	Meat	1-10 mg	1	1		2	2
CALCIUM	Milk	120 mg		2		2	2
MINERALS (GENERAL)	Vegetables	K, Cu, Cr, Mn	1	4	2	3	5
	Cereals	Fe	1			1	1
	Milk	Ca, P, Mg		1	1		1

TABLE 20 (previous page): Correct statements about the composition of foods. Source of composition of foods: Ministry of Agriculture, Fisheries and Food 1995. The composition of potatoes, pasta, rice, legumes, fishes and meats is calculated when those foods are cooked. Values are rounded up in whole numbers. G = Greeks, B = British, M = male, F = female.

NUTRIENT	FOOD	CONTENT OF NUTRIENT IN 100 G	STUDENTS				
			G	B	M	F	Total
Starch	Vegetables	0-2 g	3	2	3	2	5
	Fruits	0-16 g	3		2	1	3
Protein	Vegetables	1-3 g	2	1	3		3
	Fruits	0-3 g	1		1		1
Fat	Milk	0-4 g		1	1		1
Cholesterol	Fatty foods	0-200 mg		2	2		2
Salt	Fishes	0-4 g		1	1		1
	Vegetables	0-1 g		1		1	1
	Canned fruits			1	1		1
Vitamins	Potatoes	6-27 mg vit. C	1		1		1
	Legumes	traces of vit. A	1		1		1
Iron	Milk	0.1 mg	1		1		1
Minerals	Fruits	in some only	1	2	1	2	3

TABLE 21: Imprecise statements about the composition of foods. Source of composition of foods: Ministry of Agriculture, Fisheries and Food 1995. The composition of potatoes, pasta, rice, legumes, fishes and meat is calculated when those foods are cooked. Values of composition are rounded up in whole numbers. G = Greeks, B = British, M = male, F = female.

However, the students did not speak about certain vitamins except for vitamin D which was said that it is to be found in milk. Ironically enough, they have spoken about the only vitamin that the majority of people do not need as part of their diet as it is compounded in the body with the help of solar radiation.

Another interesting finding is the number of groups of nutrients that each student mentioned. On average 2.60 out of the 6 groups of nutrients were mentioned by each person in the sample. On average male students referred to 2.79 groups and female ones to 2.43 groups. On the other hand each British student on average referred to 2.80 and each Greek students to 2.40 groups of nutrients. These were not statistically significant differences.

NUTRIENT	STUDENTS WHO MENTIONED THE RELATIVE NUTRIENTS GREEK (20)	BRITISH (20)	MALE (19)	FEMALE (21)	TOTAL (40)
Carbohydrate	**18** (90%)	**13** (65%)	**15** (79%)	**16** (76%)	
x^2, signif.	3.584, 0.058 (1)		0.043, 0.835 (1)		**31** (78%)
Fibre	**4** (20%)	**10** (50%)	**6** (32%)	**8** (38%)	
x^2, signif.	3.956, 0.047		0.186, 0.666		**14** (35%)
Protein	**7** (35%)	**13** (65%)	**13** (68%)	**7** (33%)	
x^2, signif.	3.600, 0.058		4.912, 0.027		**20** (50%)
Lipids	**5** (25%)	**5** (25%)	**9** (47%)	**1** (5%)	
x^2, signif.	0.000, 1.000		9.657, 0.002 (1)		**10** (25%)
Vitamins	**10** (50%)	**8** (40%)	**7** (37%)	**11** (52%)	
x^2, signif.	0.404, 0.525		0.973, 0.324		**18** (45%)
Minerals	**4** (20%)	**7** (35%)	**3** (16%)	**8** (38%)	
x^2, signif.	1.129, 0.288		2.489, 0.115		**11** (28%)

TABLE 22: Numbers (in bold) and percentages (in brackets) of students that mentioned the different nutrients in foods' composition. (1) denotes limited importance of the statistic indicators due to small numbers in cells.

NUTRIENT	Correct or imprecise	Greek N=20	British N=20	Mann-Whitney U, significance	Male N=19	Female N=21	Mann-Whitney U, significance	Total N=40
Starch & sugar	Correct	34	26	147, 0.139	28	32	190, 0.780	60
	Imprecise	6	2	169, 0.204	5	3	169, 0.203	8
Fibre	Correct	5	19	132, 0.030	12	12	191, 0.774	24
	Imprecise	0	0		0	0		0
Protein	Correct	7	22	116, 0.012	15	14	163, 0.267	29
	Imprecise	3	1	180, 0.298	4	0	158, 0.029	4
Lipids	Correct	5	9	185, 0.560	12	2	138, 0.017	14
	Imprecise	0	3	170, 0.075	3	0	168, 0.062	3
Vitamins	Correct	20	13	170, 0.363	13	20	169, 0.362	33
	Imprecise	2	0	190, 0.317	2	0	189. 0.293	2
Minerals	Correct	3	8	159, 0.136	3	8	149, 0.067	11
	Imprecise	2	2	200, 1.000	2	2	198, 0.917	4
Total	Correct	74	97	157, 0.241	83	88	188, 0.743	171
	Imprecise	13	8	176, 0.422	16	5	145, 0.065	21

TABLE 23: Numbers of composition statements per nutrient.

As for the accuracy of the statements made, calculated as the ratio of accurate to the total number of statements per group of nutrients, fibre excelled all other (ratio = 1), vitamins followed with 0.94, while lipids and minerals had the lowest ratios: 0.82 and 0.73 respectively.

Finally, one **misconception** regarding food composition was found:

Saturated fatty acids are to be found in chips[2].

This misconception was mentioned once.

5.4 Measures of performance

A number of variables were developed in order to assess the numbers of beliefs and knowledge of each student and of the four sub-groups of the sample. These variables were the following:

1. The **depth of beliefs** about healthy diet. The values of this variable were the sums of beliefs that each student expressed. These ranged from 1 to 13, with a mean value 4.73.
2. The **accuracy of beliefs** regarding healthy diet was calculated as the ratio of correct beliefs (general and specific) over the sum of correct beliefs, trivial beliefs and misconceptions (as described in Sections 5.2.1-3). The values of this variable ranged from 0 to 1 with 15 students scoring 1, i.e. expressing only accurate beliefs.
3. The **comprehensiveness of beliefs** regarding healthy diet was calculated as the number of the groups of targets (as they are defined in Section 5.2.4) which each student referred to. This variable ranged from 0 to 3 and the mean of the whole sample was found 1.70.
4. The **total specific beliefs** about healthy diet. The values of this variable were the numbers of correct beliefs that each student expressed. These values ranged from 0 to 9 with the mean being 2.17.

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[2] This in fact is not a misconception in the case of Belgian "frittes" which are fried in butter and in the U.K. where chips are sometimes fried in animal fat.

5. The **depth of knowledge** about the composition of food was defined as the number of composition statements made by the students. The mean depth for the whole sample was 4.80.
6. The **accuracy of knowledge** about the composition of foods was calculated as the ratio of the number of correct composition statements over the sum of correct and imprecise statements. For the whole sample of students the average accuracy of knowledge was found to be 0.89.
7. The **comprehensiveness of knowledge** about the composition of foods was defined as the number of groups of nutrients that each student referred to. This variable ranged between 0 and 6, the mean being 2.60.

The mean scores of the above variables for the subgroups of the sample are summarized in table 24.

VARIABLE	MEAN SCORES AND SIGNIFICANCE						
	Greek (N=20)	British (N=20)	Mann-Whitney U, significance	Male (N=19)	Female (N=21)	Mann-Whitney U, significance	Total Mean (N=40)
Depth of beliefs	4.75	4.70	190, 0.785	4.68	4.76	178, 0.557	4.73
Accuracy of beliefs	0.8355	0.7613	191, 0.791	0.8010	0.7960	182, 0.616	0.7984
Comprehensiveness of beliefs	1.65	1.75	188, 0.723	1.89	1.52	158, 0.233	1.70
Total specific beliefs	1.80	2.55	160, 0.270	2.26	2.10	197, 0.945	2.17
Depth of knowledge	4.35	5.25	167, 0.367	5.21	4.43	196, 0.924	4.80
Accuracy of knowledge	0.8842	0.8929	191, 0.757	0.8190	0.9515	138, 0.043	0.89
Comprehensiveness of knowledge	2.40	2.80	168, 0.375	2.79	2.43	172, 0.437	2.60

TABLE 24: Mean values of variables describing the level of beliefs and knowledge about healthy diet.

5.5 Discussion

5.5.1 Beliefs about healthy diet

5.5.1.1 Common targets of good health: Weight control and energy provision

The bulk of the targets of healthy diet, according to the subjects of this study, point to a model of **positive health** (table 11). This is in harmony with their understanding of health (Section 4.4.2). 95% of the students have a positive understanding of health and have good reasons to believe that by eating wisely they come up to this model. Similarly the specific positive targets that they spoke about had mainly to do with appearance, namely weight control and growth.

The students' beliefs regarding the causes of **obesity** are to a great extent correct. Different epidemiological studies that sought to find how diet relates to body weight have concluded that Body Mass Index (BMI = weight/height^2) is inversely related to energy intake and that increased intake of fat may lead to obesity independently of total energy intakes (Romieu *et al.* 1988). Possible explanations include the facts that dietary fats can be stored as adipose tissue at a metabolic cost of 3% of ingested calories as opposed to 23% for carbohydrates and that carbohydrates are preferentially oxidized instead of fatty acids to replenish glycogen stores (ibid p. 411). Free sugars are not an energy dense food. However they might contribute to obesity through addiction (see Section A.1.1.4). Eleven of the 19 students that have selected weight control as one of the targets of healthy diet have successfully identified restricted fat intakes as the recommended action for it. This seems to be a common belief in British population (Parmenter *et al.* 2000 p.167). Two have identified restriction of sugar or sweets, four avoidance of general overeating, one avoidance of bread and one avoidance of meat as the proper strategies for the same reason. Finally, another student has made a positive recommendation: eating more fruits and vegetables as a strategy to avoid putting on weight. All 9 British students who expressed an opinion made sound recommendations: 7 about fat avoidance, one about sugar avoidance and one about fruit and vegetable consumption. The same cannot be said for the two Greek students who believe that meat and bread consumption is conducive to obesity. Of the 19 students who expressed an opinion all but one prescribed just one action each for the avoidance of obesity. Finally, none of the students referred to the effect that excessive alcohol intake may have on gaining weight.

Nine British students have referred to **energy provision** (tables 9 & 10), which is a crucial prerequisite for feeling well. In another survey (Gracey *et al.* 1996, p. 192) it was found that two out of three adolescent Australians believe that one of the effects of healthy eating is "feeling energetic". In the present study, however, no one has mentioned the related **sense of filling**. Different foods have different filling properties which are not always directly related to their energy content. So, it is found that fat has a weaker effect on satiation (stopping eating) and on satiety (not starting eating) compared to carbohydrates (see Department of Health 1994, p.141). Foods also vary in the rates of energy release, which makes some of them more appropriate than others for long periods without food. It looks as if satiation for many students is thought to depend only on the quantity of energy and not on the kind of food consumed. Four students referred to senses though, namely indigestibility of some foods, bowel movement and sense of sickening. The question is how many students feel bloated, sick or hungry after having eaten and whether they perceive these effects as inevitable after effects of eating. The findings of the present study suggest that the majority of young students do not connect the after effects of eating either with health or with the kind of the food consumed.

But if sensory experiences are mentioned by only a few students, feelings are conspicuously missing from their agenda about healthy food. Students had been given some clues that food can be consumed with enjoyment in the multiple choice questions about their own diet profile. Many of them had reacted positively to those clues (Section A.3.2.1). But when coming to describe their own understanding of a healthy diet no student related a healthy diet with enjoyment, socializing etc. This is an indication that for all the students, independently of whether they had or had not included the psycho-mental aspect in their descriptions of health, a healthy diet has mainly to do with the body.

Surprisingly enough, well more than half of the adolescents in the Gracey *et al.* (1996) survey related a healthy diet with "feeling good about themselves". The different origin of the samples of these two studies can hardly account for the fact that for the majority of the "Gracey" sample a healthy diet has to do with feelings, while for the two sub-samples (Greek and British) of the present study feelings do not come to mind when speaking about healthy diet. This difference should be rather attributed to the instruments of the two studies. While the present study was conducted through personal interviews, the Gracey study used questionnaires. In Section 3.1.2 it was argued that questionnaires as instruments of social study may function as devious strategies for promoting ideas. I.e., people are expected to accept as true statements which do not necessarily represent their attitudinal thoughts and beliefs. This is particularly likely to happen when the presented statements appear reasonable or even challenging. Far from being insincere, such positions cannot be considered as spontaneous either. And when the issue under investigation is people's attitudes and practices, such positions are of dubious value.

5.5.1.2 Targets of ill health: mainly CVD

Crosstabulation 18 suggests that students who define health **negatively** are more likely (though not significantly so) to refer to negative targets of healthy eating, i.e. the avoidance of diseases. This finding strengthens the need for introducing the meaning of health as a topic in health education and analyzing it as both positive and negative, a suggestion made in Section 4.5.

It seems that students view a healthy diet as having mainly **long-term results.** Among the avoid-targets that they have named (tables 9, 10) there are only chronic diseases with **CVD** most often mentioned.

Crosstabulations 12 - 15 suggest that the group that recognizes CVD both as common and as a common cause of death includes the highest percentage of students who are aware of the preventive role of diet on these diseases: 5/6 or 83.3%. The next best informed appear to be the group of the students that believe that CVD is only common (not a common cause of death) with a percentage of 69.2%, or 9/13. Then follows the group of those who believe that CVD is only a common cause of death (without being common) with a percentage of 65% or 11/17 and finally comes the group of the students that do not believe that CVD is either common or a common cause of death with 50% or 8/16.

Rogers in the Diffusion of Innovations Theory (see Section 2.2.2) maintains that we are predisposed to accept those messages that correspond to our needs and ignore those that do not. The different percentages of informed students about the preventive role that diet may have on cardiovascular diseases partly supports Roger's stance. The more convinced the students of the present study were about the risk of CVD, in terms of how common it is, the more likely it was for them to have internalized the innovation of an "anti-CVD diet". One wonders, though, why young people who believe that CVD is a common cause of death are less likely to have internalized this innovation compared to those who believe that this is both common disease and a common cause of death or common. The group that perceives CVD simply as a common cause of death may understand that CVD kills the elderly, i.e. that it is not very relevant to them. So they are not keen enough to assimilate information about the avoidance of this disease[3]. If this finding was corroborated by other studies it would strengthen the need for the introduction of some basic statistics of epidemiology in Health Education (Section 4.5).

Another reading of the same crosstabulations reveals that of the 24 students that mentioned CVD as common disease or as a common cause of death, 15, i.e. 63%, are aware of the role that diet can play in the avoidance of this type of disease (crosstabulation 15). Of the rest, only 8, i.e. 50%, recognize the preventive role of diet for CVD. This is a (very weak) suggestion that knowledge about the seriousness and commonality of a disease is related to knowledge about its causes and prevention. Of course, this cannot be emphatically supported by the findings of the present study, due to the small size of the sample, but the indication is here.

The different types of **action** that should be taken for the prevention of CVD, according to the subjects of this study, are clearly of the 'abstain' type. It is mainly fat (19 students), cholesterol (3 students), salt (3 students) and spicy foods (1 student)

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[3]According to WHO though, the second lethal diseases in Greece and the U.K. in 1995 for the age group 15-24 y (after the malignant neoplasms) were those of the circulatory system (WHO 1996).

that we must avoid. These precautions can indeed reduce the main three risk factors of CVD, namely obesity, hypertension and cholesterolemia, but they are not the only ones. Students appear to ignore the beneficial role of anti-oxidants, polyunsaturated fatty acids, (like the n-6 or n-3 groups found in fish oils), monounsaturated fatty acids and fibre (Ascherio and Willett 1995). This lack of information, apart from being a barrier to optimizing their diet, might also induce negative feelings about foods especially as all the recommendations that they are aware of are negative ones. Having said that, they have missed out an important negative recommendation concerning CVD, and more specifically the management of blood pressure, namely moderate intakes of alcohol (Dwyer 1995).

A special mention should be made about the fact that Greek students did not refer to the protective role that olive oil can play against CVD. At the present moment Greece appears to be among the countries with the lowest mortality from coronary heart disease (Τριχόπουλος *et al.* 1989). This is largely attributed to the dietary pattern of Greek population which is described as typically Mediterranean: lots of cereals, vegetables, fruits and olive oil, low in animal protein and cholesterol and high in fibre. The protective role of olive oil on coronary heart disease is attributed both to the monounsaturated fatty acids as well as to several antioxidants that it contains like tocopherols, α-carotene and large quantities of phenolic compounds (Ferro-Luzzi *et al.* 1994). If this information is not internalized by the Greek young adults, as the findings of this study suggest is happening now, they will probably cut down on oil because they will develop the erroneous idea that oil being a kind of lipid is harmful for the heart.

To sum up, the beliefs that students expressed about the relation between diet and CVD are partial. Students spoke about things that we must avoid, and not about things that we should go for. This may reveal an equally partial instruction which is not updated to reflect the current nutritional studies on this topic. Additionally, only four out of the 23 students that referred to CVD mentioned two actions, the rest of them mentioning only one action, usually low fat diet.

If students' beliefs about the effect of diet on circulatory system appears to be unilateral, their knowledge regarding the effect of diet on **cancers** is outright doubtful. Sound instruction on this issue would be quite useful. According to HEA (1990) it is estimated that 35% of cancer deaths are related to diet. If such information was included in health education, it would probably be well received and assimilated as 90% of the students have recognized cancer as either common or as a common cause of death and 50% of them as both common and a common cause of death (crosstabulation 7). Only one of them, though, mentioned the preventive role of diet against cancer of the digestive tract. It is highly unlikely for students to have been well informed about this role of diet and to not have mentioned it in their beliefs, given their awareness of cancer incidence. It looks then that there is lack of information both in their communities and in school regarding the alleviation of the risk of cancer from a fruit and vegetable rich diet.

The apparent lack of adequate information of the students of the present study on the link between diet and cancer is in conflict with one of the findings in a survey where over 40% of a regular British sample consisting of people older than 18 years seem to be informed about this link (Parmenter *et al.* 2000). This survey was also conducted with questionnaires. What has been said in Section 5.5.1.1 about the misleading eloquence that the questionnaire surveys attribute to people may be also relevant here. In addition, there is another element that differentiates the two studies (the present and the one by Parmenter *et al.*): the age of the participants. An older sample is expected to be better informed in matters of healthy habits.

Vitamins and minerals are crucial for **immuno-competence** (Sherman 1992). Some studies also suggest that imbalanced intakes of micronutrients enhance the risk of serious infectious diseases (Maki & Newberne 1992). The general immunity provided by a balanced diet is mentioned by only two students. Of those one only related immunity with under-nutrition and the other said that immunity is boosted by proper diet but did not describe which type of diet. On the other hand, the micronutrient content of foods is one of the least frequently mentioned (tables 20, 21). Only 11 students referred to minerals. Additionally, infections were mentioned as causes of diseases by only 10 students and cold or flu as common diseases by 14 students. Twenty one students did not refer to any of those common diseases nor to infections. The data presented in this paragraph taken as a whole suggest that the students underrate the role that infections can play in reducing health and are not well informed on the very pragmatic protection that a balanced diet (especially as far as micronutrients are concerned) can offer against infections.

In the interviews, health of **bones** and blood are the most often mentioned targets having to do with body functionality and the avoidance of related diseases. Health of bones is very significant for public health. According to WHO (1990, p.81) the rate of hip fractures in the U.K. in 1970 was 63.1 incidences per 100,000. Health of bones was actually mentioned by seven students. From those only one named two actions, vitamin and dairy foods intake. The rest named only one: calcium, dairy foods or vitamins. Calcium, according to WHO (1990, p.82), is by no means the key factor determining bone density. Bone health depends on many factors like status of estrogens, immobility, smoking, alcohol and drug therapy, calcium intake and balanced protein and salt intakes. Especially for the factors related to nutrition, Massey (1993) argues that dietary sodium, caffeine, phosphate and potassium alter calcium metabolism through alterations in vitamin D metabolism so that the overconsumption of the first three as well as the low consumption of potassium may be detrimental to bone health. It appears then that in this case students' beliefs are rather narrow and that they ignore or, more likely, don't know that bone mass is determined by different interacting factors with many of them being nutritional (See also Ziegler *et al.* 1995).

The same may apply to beliefs expressed about health of **blood**. All five students that mentioned it referred to only one action: iron intake for the avoidance of anaemia (which was mentioned by two of the three vegetarian girls in the sample), vitamin intake or hydration. All these students were British and female, except one who was a Greek male. Iron intake is quite crucial for the health of blood. The fact that 2 out of the 3 vegetarian girls understand the need for iron supplements is, of course, positive. Vegetarians are especially vulnerable to iron deficiency and anaemia even when they take enough iron in from plants, because of the low bioavailability of this type of iron (Shaw *et al.* 1995). But the problem of iron deficiency is not one that should concern vegetarians only. The UK Health Education Authority (1995, p.22) suggests that one fifth of adolescent girls may be anaemic due to the growth spurt and menstruation and that all girls of this age need increased intakes of iron. Athletes is another population group which might be at risk of low blood iron status. Weaver and Rajaram (1992) argue that iron deficiency is a common problem in athletes who do not increase their iron intakes above normal levels and that this can affect athletic performance as well as general health and immune functions. In the present study 15 students have reported strenuous exercising. None of them mentioned the need for increased iron intakes though. So, iron intakes and bioavailability of iron from the different foods ought to be a real concern for all students and especially females, athletes and vegetarians. The findings of the present study suggest that only the last group is alert.

5.5.1.3. General beliefs and revealed trends

The findings presented in Section 5.2.1 suggest that **Atwater's** triptych (variety, moderation, proportionality) may not be very trendy. Indeed seventeen out of forty students did not mention any of those attributes of a healthy diet. Only two students mentioned all three of them. The bulk of students' beliefs on the issue of a healthy diet is either nutrient- or food-specific. When students referred to nutrients (and they did so most often), they were more likely to express correct beliefs and they combined them to a variety of targets. Students referred less often to foods and when they did so they were more likely to express trivial beliefs within a very narrow range of targets (see tables 9 and 10). In Section 1.4.1 the two approaches of nutrition education, i.e. the **food-specific** and the **nutrient-specific**, were discussed. It was hypothesized that nutrients may act as symbols which can facilitate learning about food. The findings of the present research support this hypothesis because students were significantly more accurate and comprehensive whenever they spoke about nutrients than when they spoke about foods.

The **profile of actions** that should be taken for the implementation of a healthy diet as described in table 16 reveals that students are mainly concerned with the selection of foods and to a lesser extent with restraint from excesses regarding the total quantity of food and the proportion of its constituents. Ideally, concern about the kind of food and restraint should be of equal importance. Low **self-restraint** is the most usual factor leading to obesity (BMI > 40), which is considered to carry risks of:

> "hypertension, coronary heart disease, diabetes mellitus and gastrointestinal disorders, e.g. gallstones. The risks of cancers of the gallbladder, breast... and uterus are increased in obese females, as are perhaps the risks of prostate and kidney cancer in obese males" (WHO 1990 p. 71)

The findings of this study were that only one in four students mentioned explicitly the need for moderation in eating (Section 5.2.1) and that one in five failed to mention any action pointing to self-restraint. This finding is not so bad compared with another study exploring through interviews adults' ideas about healthy diet, in which the issue of moderation was not raised at all (Povey *et al.* 1998). It is believed that females are more preoccupied with their body image than males. However, statistics in table 16 suggest that female students are not more likely to speak about self-restraint than male ones.

Slightly more Greek students spoke about self-restraint than British ones (18 vs 14). Obesity appears to be more of an issue for British society than for the Greek one. According to DoH (1994, p.59) the percentage of men and women with BMI in excess of 30 grew steadily between 1980 and 1991. In Greece, though, the already low percentage of obese young people appears to have remained steady for the last 20 years (Γεωργιάδης *et al.* 1993). So one would expect that more British students would be concerned about the need for moderation. However, as pointed in Section 5.5.1.1, many British students maintain nutrient-specific knowledge on weight control.

The actions that aim at good **food quality** appear to be the least often mentioned by the students. Not surprisingly it is almost exclusively the female students who appear to be concerned about food quality. It looks as though traditional social norms that attribute the responsibility of diet to the housewife are deeply rooted and lasting (Brown 1980).

Food quality does not depend absolutely on the choices of the individual. Although in developed countries there is an abundance of foods in stores which vary in the methods of production and processing, most of the time the ability of the individual to choose the best in terms of quality are restricted because of price policies and lack of information and legislation. Here are some examples of common policies that show how food quality depends on politicians and food industry:

1. Animal products coming from free range animals are usually more expensive than those products that come from restricted animals.
2. Food additives are allowed or disallowed by national or international (e.g. European Union) legislative bodies.
3. Information about the effects that pesticides, chemicals or packaging materials have on foods is not widely recognized.

Someone's potential to influence any of these practices acting as an individual is minimal. It is only through the participation of the individual in consumers' unions, through campaigning or through lobbying that one may finally influence any of these processes. The majority of the students of the present study did not appear sensitive to the need of such action. Perhaps they have not had opportunities to explore such issues at school. Anyway, this is one more indication that young adults have developed an individualistic model of health (see Section 4.4.2).

When the interviews of the present study were carried out, the BSE crisis, widely known as 'mad cow disease', was a hot public issue in both countries because there were some indications that this disease had crossed the species barrier and had started affecting humans who had fed on contaminated meat. Only two Greek students mentioned this crisis. The first in order to support her belief that it is healthy to cut down on animal foods and the second as a proof that today there are no healthy foods at all.

It appears then that the students are split into two unequal groups: the majority, that seems to overlook the issues of safety of food production, and the minority, who although not ignoring these issues have finally developed nihilistic attitudes. Both these stances are manifestations of the individualistic model of health. People who are entangled in this model have in one way or another simplified the triangle of health (figure 1). Some of them have not realized how their social, economic and natural environment affects their health (e.g. through availability and quality of food). Typical instance of this ignorance is the majority described above. Some others, like the minority of this study, do not see the possibility of affecting the environment through their lifestyle.

5.5.2 Knowledge of nutrients

The way that the students responded to stimuli relevant to the composition of foods is described in Section 5.3. Students spoke about **starch** more often and more accurately than about any other nutrient. This applies especially for the Greek students who mentioned starch in 90% of the interviews, whereas the English students mentioned starch in 65% of the interviews (see table 22). This difference may reflect the different eating patterns in the two societies. Starchy foods are the basis of the Mediterranean diet with bread the most common of them. Meals in Greece are always accompanied by bread. Indeed, twelve Greek students mentioned the starchy composition of bread compared with only two Britons. British students, on the other hand, recognize a greater variety of starchy foods. They referred more often to rice and pasta than Greeks did. The imprecise perception that starch is found in fruits and vegetables was met more often among Greek students than among British ones. It is quite unlikely that Greeks referred to potatoes speaking about the starchy content of vegetables because the Greek term about vegetables (λαχανικά) is closer to the British term greens.

Protein is the second most often mentioned nutrient from the whole sample. 65% of the British students mentioned it, which is as often as they mentioned starch, compared to only 35% of the Greek students. British students had a more complete picture about the sources of protein. They referred to six of these compared to only three named by the Greek students. It is surprising that none of the Greek students referred to the protein content of legumes. This becomes more surprising if we bear in mind that bean soup is (or was?) considered as the "national Greek plate". The professed vegetarians failed to mention the protein content of legumes too, which is also surprising because for vegetarians legumes are normally the basic protein providers. More boys than girls referred to the protein content of foods. This may reflect the concern of boys for fitness and a strongly built body. Indeed, all four boys who related protein to fitness, growth and energy provision (table 10) also mentioned food sources of protein.

Food sources of **lipids** are mentioned by only one out of four students, a ratio constant along the national groups but very different along the gender groups: 1 out of

2 boys and 1 out of 21 girls! Again Greek students refer to fewer fatty foods than British students and the Greek students seem more preoccupied with cholesterol than with triglycerides. It is difficult to explain why just one girl referred to fatty foods, especially if we take into account the preoccupation of girls with slimness and the high energy density of fatty foods. So, one of the more significant statistical differences found in this study may simply constitute a "type 2" statistical error, i.e. it may be an accidental finding, rendering a non-existent difference in the beliefs of the underlying populations.

British students also appeared to be better informed about the sources of **fibre** than their Greek counterparts: 10 British students referred correctly to eight fibre-rich foods compared to 4 Greek students who named just two.

Eleven Greek and an equal number of British students referred to foods which provide us with **micronutrients**. However, Greek students and boys appear more preoccupied with vitamins, whereas British students and girls are equally concerned with vitamins and minerals. The foods that are usually believed to be vitamin providers are fruits and vegetables. Of course, people who usually have a variety of fruits and vegetables consume enough vitamins and in substantial quantities. But are students aware that some vitamins like B_{12} are mainly available from meat? And do they know that some fat-soluble vitamins are difficult to obtain from greens and fruits only? (see Sections 1.3.2 and A.1.2.1).

In Section 1.4.2 it was mentioned that the "food guide pyramid" separates fruits from vegetables in order to convey the message that these are foods with different nutritional profiles. Vegetables, for instance, surpass fruits in mineral content. This message might be of some use to the students of the present study, where 3 out of ten who referred to the mineral content of foods said that minerals are found in fruits (see table 21). Many metals are critical for immunization (see Section 1.3.2). Iron deficiency was discussed in Section 5.5.1.2.

As far as food composition is concerned, the British sample surpassed the Greek one in all the parameters:

1. The number of these statements (table 23).
2. The accuracy of these statements (table 24).
3. The mean number of nutrients that each student mentioned (table 24).

Although none of these differences was found to be statistically significant, taken together as a whole they suggest a better grounding of the British students in food composition.

On the other hand, a different profile between male and female students emerged from these findings. Boys excelled in fluency (greater depth of knowledge and mentioning of more groups of nutrients) whereas girls excelled in accuracy.

5.6 Conclusion

At this point some general answers will be given to the questions posed at the beginning of Chapter 5.

1. Most of the students **perceive a healthy diet** as aiming at bodily well being. The most often referred targets of good health are energy provision, growth and weight control, while the avoidance of CVD is the most often referred target of ill health. The large majority of students have developed a code of beliefs which can be described as "one nutrient for each condition". This applied in the cases of CVD, obesity, health of bones and health of blood. Especially for CVD and obesity all the recommendations are of the "abstain" type.

2. Students' **understanding of healthy diet** is characterized by accuracy, but is not extensive or comprehensive enough. All students appear to be poorly instructed on the following issues:
   a. The anti-oxidative and oxidative roles of certain nutrients.
   b. The relation between several common diseases (especially some types of cancer) and diet.

3. Students' understanding of **a healthy diet** corresponds, to some extent, to their understanding of **health**. So the bodily element is dominant in both health and

healthy diet and environmental and social issues are not referred to as relating to diet. Senses and feelings of well being are also absent. Moreover, health is understood as the health of the individual and the actions that should be taken for diet improvement also depend on personal activation. However, the specific targets of a healthy diet as described by the students are rather restricted and not enough to cover their own model of health.

4. Generally, the sub-samples of the present study understand a healthy diet in a common way, with few variations, namely:

- Greeks appear more preoccupied with starch, whereas Britons with protein and fibre.
- Britons appear better trained than Greeks with regard to food composition.
- Britons made more accurate recommendations about weight control than Greeks.
- More girls than boys appear concerned about food quality.

In addition to the answers given to the questions posed in the start of this Chapter, two **mental trends** that emerged during the analysis should be also mentioned:

1. The students are more specific, comprehensive and correct whenever in their beliefs about food physiology they involve nutrients than when they speak about foods, a finding that lends support to the theory that the symbolic nature of nutrients facilitates learning.
2. There were some indications that the knowledge about the commonality or the lethality of a disease is combined with knowledge about its causes or about the methods of prevention.

These trends are of some importance for learning and psychological sciences. However, their significance would be established through further research.

Chapter 6: MENTAL PROCESSES

6.1 Introduction

The main subject of Chapter 5 was students' understanding about healthy diet, i.e. a purely cognitive approach about a quite pragmatic matter. More specifically, the breadth, depth and accuracy of their understanding of diet was examined. In the present Chapter it will be investigated how functional and reliable this understanding is.

As discussed in Chapter 2, all theoretical models start from people's knowledge in order to predict their behaviours. But knowledge alone is not a safe predictor of eating patterns (Merron *et al.* 1998). Choosing, preparing and consuming healthy food demands, among other things, certain skills which rely on how this knowledge is internalized. Possessing these mental skills is tantamount to having acquired the necessary 'how to knowledge' (Section 2.2.2) and will have a positive impact on one's perceived self-efficacy (Section 2.2.1), both of which are believed to be facilitators of the recommended behaviour.

Consequently, people's understanding about a healthy diet is meaningful for explaining or predicting their eating patterns to the extent that it can play an operative role in their way of thinking. For example, when one says that "diet should be varied" one may simply echo a view one has heard, which view plays a minimal if any role in one's mental processes for planning a diet. On the other hand, a similar view from another person may exactly express his or her practice of devising a diet.

The exercises which will be presented here were designed in order to bring to the fore the operative thoughts of the students. The technique used in these exercises was similar. The students were presented with informational and educational materials and were asked either to interpret them or to elaborate them. The information collected from their answers will be interpreted in two ways. Firstly it will be used in order to test and possibly corroborate the findings of the previous Chapter (5). Secondly, it will be examined how operative are the previously expressed views, i.e. to what extent these views reflect familiar mental processes. The students' thoughts will also be compared on the basis of their nationality and gender.

The methods of analysis and the way of presentation of the findings are those followed in Chapter 4. These methods and ways of presentation appear in Section 4.1.

6.2 First exercise: the 'WHO table'

6.2.1 Recognizing the diet-related diseases

In The "WHO report" the **population nutrient goal** is defined as the:

> "... average intake that is judged to be consistent with maintenance of health in a population. Health in the population is, in this context marked by a low prevalence of **diet-related diseases** in the population" (WHO 1990 p. 160].

Later the authors justified the given nutrient goals on the grounds of the following epidemiologic evidence:

1. The risk of certain types of **cancer** is directly associated with the level of total fat in the diet.
2. A decreased intake of saturated fatty acids is followed by a progressive fall in mortality from **cardiovascular** disease and there is evidence that mortality due to **coronary heart disease** is related to dietary cholesterol intake.
3. **Dental caries** rates increase with increases in population sucrose intakes.
4. The increased intake of complex carbohydrates aids intestinal functioning and may have beneficial consequences for **diabetes** and cancer.
5. The main factors influencing **weight control** are fat, complex carbohydrate and fibre intake.
6. There is a causative relationship between high fat and low fibre intake and the formation of **gallstones**.
7. Energy malnutrition and macronutrient imbalances may lead to **stunting** (kwashiorkor).
8. **Osteoporosis** is related to unbalanced calcium, protein and salt intakes.

The responses of the students to the questions about the diet-related diseases were assessed against the information described above.

Here is a table taken from a WHO report (The student is left to peer at it for some time). Which are the food-related diseases that this table refers to?

Most of the students interviewed saw the WHO population nutrient goals as aiming mainly at the avoidance of cardiovascular diseases. Other diseases or conditions were mentioned to a lesser extent with cancer paradoxically mentioned by only 2 students. Table 25 summarizes the students' answers. Diseases referred by the students which are not diet-related or are diet-related but do not depend on the nutrients prescribed in the WHO table used in the interviews (e.g. anaemia, vitamin deficiency etc), are categorized in the category of the non-relevant diseases.

In the group of cardiovascular diseases the following specific diseases or risks were mentioned: heart disease (26 students), high serum cholesterol (6 students, usually naming it "cholesterol"), high serum triglycerides (1 student who named it "triglycerides"), stroke (3 students) and atherosclerosis (1 student). None of the 7 students who referred to diabetes made the distinction between insulin-dependent and non-insulin-dependent diabetes. One of the two students who referred to cancer spoke about "some forms of cancer", while the other one spoke about cancer as being one kind of disease.

The diseases that were not related to the 'WHO table' were: Stomach disorders and poisonings (6 students, 5 Greeks, 4 male), stomach ulcer (2 Greek students), anorexia (4 British students, 3 female), bulimia (2 British students, 1 female), anaemia (1 British, female student), liver failure (1 British, female student), kidney failure (3 students, 2 British, 2 female), cataract (1 Greek, male student), skin diseases (1 Greek, male student) and vitamin deficiency (1 Greek, male student).

The intention of the crosstabulations 26 and 27 is to examine to what extent the previously expressed beliefs of the students can be used to predict their answers to the present question. This examination is restricted to the most often mentioned diseases: CVD and obesity. It appears that obesity may possess this property to some extent.

DISEASES	NUMBERS AND PERCENTAGES OF STUDENTS				
	Greek (N=20)	British (N=20)	Male (N=19)	Female (N=21)	Total (N=40)
Cardiovascular dis.	15 (75%)	14 (70%)	14 (74%)	15 (71%)	29 (73%)
Obesity	4 (20%)	8 (40%)	5 (26%)	7 (33%)	12 (30%)
Diabetes	5 (25%)	2 (10)	4 (21%)	3 (14%)	7 (18%)
Osteoporosis	3 (15%)	0	2 (11%)	1 (5%)	3 (8%)
Cancer	1 (5%)	1 (5%)	1 (5%)	1 (5%)	2 (5%)
Dental caries	0	1 (5%)	1 (5%)	0	1 (3%)
Gallstones	1 (5%)	0	0	1 (5%)	1 (3%)
Stunting (kwarshiorkor)	0	1 (5%)	1 (5%)	0	1 (3%)
Diseases not related to the 'WHO table'	8	7	8	7	15 (38%)

TABLE 25: The diseases targeted by the 'WHO table' as recognized by the students

CVD recognized as target of the 'WHO table'	CVD mentioned as a target of healthy diet		Total	Obesity recognized as target of the 'WHO table'	Obesity mentioned as a target of healthy diet		Total
	yes	no			yes	no	
yes	17	12	29	yes	7	5	12
no	6	5	11	no	10	18	28
total	23	17	40	total	17	23	40
Pearson $x^2 = 0.054$ Significance = 0.816				Pearson $x^2 = 1.759$ Significance = 0.185			

CROSSTABULATIONS 26 & 27: Targets of the 'WHO table' * targets of perceived healthy diet

6.2.2 Quantities of nutrients in the 'WHO table'

Which are the nutrients that we must eat most, which less and which ones we should avoid according to this table?

The question about interpreting the 'WHO table' in terms of **nutrients** was put to the British students only as a bridge for the following question, which asked the students to paraphrase this table in foods. It became evident from the interviews in series 4 that the students met difficulties in this paraphrasis. Table 28 summarizes the responses of the British students only.

NUTRIENT	Eat much/more			Eat			Eat less/ moderate			Eat minimal		
	M	F	T	M	F	T	M	F	T	M	F	T
Energy		1	1									
Fat in general					1	1	3	8	11			
Saturated fatty acids							4	4	8			
Unsaturated fatty acids		1	1		3	3	2		2			
Cholesterol		1	1							5	3	8
Starch/carbo-hydrates	6	7	13	2	1	3		2	2			
Fibre	3	2	5	2	3	5						
Sugar					1	1	5	4	9			
Protein	4	2	6	3	4	7	2	1	3			
Salt				2	1	3	6	6	12			

TABLE 28: Recommendations about nutrients according to the 'WHO table'. Numbers of British students

Lipid intakes appear to be in the "avoid" part of the table. Eighteen out of the 20 British students said that we should avoid fat in general or saturated fatty acids specifically. Only 5 though made the correct distinction between saturated and unsaturated fatty acids. This distinction actually produced some puzzlement. Some believed that saturated fats would be preferred over unsaturated fats. After the interviewer suggested concentrating on the figures of the 'WHO table' the confusion dissolved:

> "The same with fat, fatty acids, they all contribute to obesity, being overweight and because of that, that eventually lead to your arteries being clogged up,... Saturated fats actually are better for you than unsaturated. The saturated have one bond between the carbon atoms of the fat molecules...
>
> *Which are better you said?*
>
> Saturated...
>
> *Can you judge from the figures given there?*
>
> From the figures?...
>
> We must cut down these.
>
> *Can you name them please?*

Yes, sugars, saturated fatty acids and dietary cholesterol." (B.30, Q.18)

Some others said that they were not sure on that issue and the table could not help them anyway. Here is a revealing dialogue with a Greek student (case not included in table 28):

> "As I've said before. They should eat foods with which they avoid the polyunsaturated.
>
> *-They should avoid them...*
>
> -Yes... I think so, well I might not tell you the right thing, I cannot give a sure reply...
>
> *-Yes, but you have that table in front of you.*
>
> -Yes, they should eat of everything not in large amounts..." (G.18, Q.18)

Many students spoke about the need of salt in our diet. Only one student though made the distinction between salt included in foods and additive salt:

> "Er... to take your daily intake of salt I would suggest having natural salt by fish etc seafood rather than actually using table salt..." (B.25, Q.20)

Finally one girl was misled by the large number of cholesterol mg and said that we must have large intakes of cholesterol.

Sixteen out of the twenty British students agreed that we must have sufficient intakes of carbohydrates or starch. One of them gave an explanation for it:

> "Eat more carbohydrates, because that's burnt easily, more easily by the body than fatty acids..." (B.24, Q.19).

One of the two girls who said we must cut down on carbohydrates justified this as follows:

> "Fat is not very good for you, carbohydrate you need because of the energy, but that also can convert into fat, so you need to take that in moderate amounts." (B.27, Q.19).

An amazing finding is the large number of pupils who insisted that we must consume large quantities of proteins despite the fact that in the 'WHO table' it is recommended that only 10-15% of energy intakes must come from protein, a percentage lower than that allotted to fat! Overall fourteen students said either "eat much" or simply "eat" which is not identical to "eat the necessary amounts" and is certainly at odds with "eat a moderate amount of". A boy said that "protein is important because it makes muscles stuff..." and a girl distanced herself from the figures of the table:

> Er... protein isn't very high but I thought it was quite important in the diet ...
>
> *Protein yes, you find it low.*
>
> Mm. Well compared to the other figures, I don't know if it's..." (B.37, Q.19)

6.2.3 Quantities of foods inferred from the 'WHO table'

How should our diet be in terms of foods in order to take those quantities of nutrients?

The exercise described here explored the skills of tomorrow's school graduates to express theoretical notions, i.e. quantities of nutrients, in lay dietary terms. The diet that the students improvised sticking to the 'WHO table' is here broken down into five groups which correspond to the five sectors appearing in the 'HEA plate' (see Section A.2.2.1). Each section of table 29 includes the foods appearing in these sectors and selected by the students. British students have used the verb "to eat" 59 times, and only 12 times the phrase "to eat much". Greek students, on the other hand, have used the second phrase 19 times and the verb "to eat" 8 times. It is very possible that these two expressions may not necessarily mean different quantities of intakes but may simply reflect linguistic differences. However, the two types of statements are tabulated separately.

The need for eating more fruits and vegetables is clear for 13 Greek students vs 9 British ones. Fruits are mentioned less often than vegetables. In all 20 statements were made for vegetable consumption vs 8 for fruits. Fifteen British students said that we must eat/eat much of the starchy foods vs only 6 Greeks. On the other hand, 8 Greeks said that we must cut down on starchy foods, a view shared by only 3 British students. The food that was mainly responsible for this disagreement was bread: warmly recommended by the British, less so by the Greeks.

GROUP	FOOD	EAT MUCH					EAT (UNSPECIFIED)					EAT MODERATELY				
		G	B	M	F	T	G	B	M	F	T	G	B	M	F	T
Green	Fruits	3	1	1	3	**4**	1	3	1	3	**4**					
	Vegetables	11	2	4	9	**13**	2	5	5	2	**7**					
	Total	11	2	4	9	**13**	3	8	6	5	**11**					0
Starchy	Bread	1	1	2	0	**2**	1	7	2	6	**8**	8	1	3	6	**9**
	Potatoes	1	2	3	0	**3**	4	6	6	4	**10**	3	2	1	4	**5**
	Pasta	1	1	2	0	**2**	0	4	1	3	**4**	0	1	0	1	**1**
	Rice	0	1	1	0	**1**	0	2	0	2	**2**	1	1	0	2	**2**
	Cereals	1	0	0	1	**1**	0	6	3	3	**6**	0	0	0	0	**0**
	Total	3	2	4	1	**5**	4	13	8	9	**17**	8	3	3	8	**11**
Protein	Meat						4	11	8	7	**15**	9	1	6	4	**10**
	Chicken						0	2	0	2	**2**	0	0	0	0	**0**
	Fish						1	3	2	2	**4**	0	0	0	0	**0**
	Sausage						0	0	0	0	**0**	0	2	2	0	**2**
	Eggs						2	0	1	1	**2**	1	1	2	0	**2**
	Legumes						1	4	3	2	**5**	1	1	2	0	**2**
	Total					0	6	15	11	10	**21**	9	4	9	4	**13**
Dairy	Milk	1	0	1	0	**1**	0	3	2	1	**3**	1	0	1	0	**1**
	Yogurt	1	0	1	0	**1**	0	1	0	1	**1**	1	0	1	0	**1**
	Cheese	0	0	0	0	**0**	0	4	1	3	**4**	0	0	0	0	**0**
	Butter	0	0	0	0	**0**	0	0	0	0	**0**	1	0	1	0	**1**
	Total	2	0	2	0	**2**	0	5	2	3	**5**	2	0	2	0	**2**
Fatty & sugary	Sweets											9	4	6	7	**13**
	Chocolate											0	1	1	0	**1**
	Chips											0	5	3	2	**5**
	Total					0					0	9	7	9	7	**16**

TABLE 29: Recommendations of foods in food groups made according to the 'WHO table' analyzed in national groups and gender of students. Numbers represent students. G = Greek, B = British, M = male, F = female, T = total.

Another difference between Greek and British students appears in the protein foods. Nine out of the fourteen Greek students that spoke about these foods said that we must have moderate intakes of them. In contrast, only 4 out of the 15 British students that referred to this type of food shared this view. The rest of them did not mention the need for moderation. Some British students are prudently cautious with the kind of foods included in this group: avoid sausages and eggs, prefer chicken, fish and legumes.

Dairy foods were mentioned by the smallest number of students. These students were equally divided among "advocates" and "cautioners". Finally, the sixteen students that referred to fatty and sugary foods were unanimous in recommending small intakes.

The **mistaken** recommendations were of two kinds: cut down on starchy foods and eat/eat much meat foods. There were 17 recommendations of the first type and 19 of the second one. The starchy foods that it was suggested should be cut down on were bread (9), potatoes (5), rice (2) and pasta (1). These recommendations were made mainly by female and Greek students (see table 29). Controversial recommendations about protein foods were those considering meat (15), chicken (2) and eggs (2). Two-thirds of these recommendations were made by British students. Recommendations to eat/eat much fish and legumes were not considered as controversial because, although these foods are considered to be protein providers, they also include other nutrients which are beneficial: fishes contain poly-unsaturated fatty acids of the n-3 family and legumes contain starch and non-starch-polysaccharides (NSP). Finally, the recommendation, made just once, of immoderate consumption of milk was considered as controversial.

As for differences between **genders**, it looks as if more girls recommend an increased intake of fruits and vegetables than do boys and that girls may be more cautious than boys about the consumption of starchy foods. More boys speak about protein foods than girls, but 9 out of 20 speak about moderate intakes versus 4 out of 13 for girls.

The way that the British students translated the 'table' into foods was collated to the way that they interpreted it in terms of nutrients. Table 30 summarizes this collation. (Greek students were not asked to interpret the 'table' in terms of nutrients.)

Table 31 summarizes numbers and percentages of students that referred to foods of the several sectors. The starchy and protein sectors were the most frequently mentioned sectors. The dairy sector was the most infrequently visited sector. When we come to comparisons, we find Greek students having paid almost equal attention to green, starchy and protein sectors whereas British students have mainly concentrated on starchy and protein ones. More Greek students paid attention to the fatty and sugary sector than British students. As for gender comparisons, boys appear concerned with protein foods to a greater extent than girls (Pearson chi-square = 3.480, $p = 0.062$).

'WHO TABLE' INTERPRETATION IN TERMS OF NUTRIENTS		'WHO TABLE' INTERPRETATION IN TERMS OF FOODS		
		Type of recommendations	Mean recom/tions per student	Mann-Whit. U & sign/ce
Eat much/ eat (unspecified) fibre	Selected (N=10) Not selected (N=10)	Eat/eat many fruits and vegetables	0.80 0.30	32 0.126
Eat much/ eat (unspecified) fibre	Selected (N=10) Not selected (N=10)	Eat/eat many starchy foods	1.70 1.30	41 0.461
Eat much/ eat (unspecified) fibre	Selected (N=10) Not selected (N=10)	Eat moderate starchy foods	0.20 0.30	46 0.584
Eat much/ eat (un-specified) protein	Selected (N=13) Not selected (N=7)	Eat much/eat (unspec-ified) meat & alter/tives	0.69 0.43	36 0.371
Eat much/eat (unspecified) starch	Selected (N=16) Not selected (N= 4)	Eat many/eat (unspec-ified) starchy foods	1.63 1.00	26 0.560

TABLE 30: Comparison of the interpretation of the 'WHO table' in terms of nutrients with the translation of the same document in terms of foods.

Food sectors	Greek (N=20)		British. (N=20)		Male. (N=19)		Female. (N=21)		All students (N=40)	
	No	%	No	%	No	%	No	%	No	%
Green	13	65	9	45	10	53	12	57	22	55
Starchy	14	70	15	75	13	68	16	76	29	73
Meat and alternatives	13	65	15	75	16	84	12	57	28	70
Dairy	3	15	5	25	5	26	3	14	8	20
Fatty & sugary	9	45	7	35	9	47	7	33	16	40

TABLE 31: Making sense of the 'WHO table': Frequencies of students who mentioned each food group

Table 32 summarizes the numbers of mentionings that students made per food sector. Greek students mention foods from the green, starchy and protein sectors with about the same frequency, whereas British students' main concern seems to be with the starchy sector and secondarily with the protein one. These two sectors appear to be the most often mentioned sectors from the boys but in reverse order: protein food comes first. Girls' main preoccupation, on the other hand, appears to be mainly with one group of foods: the starchy ones. The only near significant difference between the sub-samples concerning specific food groups was the number of times Greek and British students mentioned starchy foods.

Food sectors	Greek st. (N=20)		British st. (N=20)		Male st. (N=19)		Female st. (N=21)		All students (N=40)	
	No	Mean	No	Mean	No	Mean	No	Mean	No	Mean
Green	17	0.85	11	0.55	11	0.58	17	0.81	28	1.27
Starchy	21	1.05	35	1.75*	24	1.26	32	1.52	56	1.93
Protein	19	0.95	25	1.25	26	1.37	18	0.86	44	1.57
Dairy	5	0.25	8	0.40	8	0.42	5	0.24	13	1.63
Fatty & sugary	9	0.45	10	0.50	10	0.53	9	0.43	19	1.19

TABLE 32: Making sense of the 'WHO table': Frequencies of students' mentionings per food group and mean mentionings per student. * Mann-Whitney U = 141, p=0.1

6.3 Second exercise: the 'HEA plate'

6.3.1 Recognizing the message

The questions to do with the 'HEA plate' were looking for the students' first reactions, their interpretations of the motives behind the 'plate', comparison with their own diet and positioning against the prescriptions of the 'plate'. In this Section their reactions and interpretations will be analyzed and discussed. The comparison with their own diet will be dealt with in Chapter 7, which deals with the students' eating habits. Finally, the students' comments on the 'HEA plate' will be analyzed and discussed in appendix 3, which deals with their critical positioning on matters of diet and health.

Here is the 'plate of healthy diet' which is recommended by today's dietitians. Do you recognize any obvious message(s) in it?

Students' first reactions on seeing the 'plate' were of four types:

1. Proportionality
2. Variety
3. Quantities
4. Keep away from...

Proportionality. Twenty two students (12 British, 12 female) reckoned proportionality as one of the messages of the 'plate'. They expressed it in many ways:

"large amounts vs small amounts", "eat more vs eat less", "vast proportions vs low areas", "eat little of this, lots of this", "eat more of... than..." etc. Here is a typical response:

> "Yes, I mean obviously fruits and vegetables stick out, there is a lot of it here and it's the first that jumps out, so I think that they try to get across the point that you should eat more of those... and then... I think the bigger ... because this one as well with the cereals and potatoes that also stands out because not only that is bigger (...) I don't know those two jump out first of all... and I think they try to say eat more of those and, maybe, cut down on the other things." (B.21, Q.21)

However, not all the students perceived proportionality in the same way. Two Greek students (G.09, G.14) saw an unexpected smaller amount of starchy foods:

> "How much we should eat from some things. Veg., fruits and legumes in large quantity. Starch as I see here potatoes, bread and pasta in a bit smaller (quantity), then dairy foods and..." (G.09, Q.19)

Both these students when interpreting the 'WHO table' had recommended moderate proportions of starchy foods.

Three Greek students overemphasized the importance that the 'plate' gives to the dairy foods:

> "We must eat too many fruits and veg., enough cereals, pasta, bread and potatoes, as much as milk and its derivatives...
>
> *-Is it in the same proportions?*
>
> -It's a little restricted, but this is important I think." (G.13, Q.19)

In some cases, though, the 'HEA plate' generated conceptual conflict. Here is a student changing her mind about starchy foods:

> "It has pasta, potatoes, bread, these are the things we should avoid, as opposed to ... There is a proportion of use. First of all there are the fruits and veg.; second category, or rather equivalent to it, it has the bread and pasta, after this the milk, then fish and meat, and last of all the sweets." (G.04, Q.19)

The same student had earlier said that we must cut down on bread.

One student saw proportionality within rather than across sectors:

"Yes, yes more green vegetables to be eaten, more... well, less red meat but more white meat, and fish, fish is white meat, so is chicken..." (B.30, Q.21)

Variety was thought to be a message of the 'plate' for 15 students (8 British, 9 female). This is an eloquent description of variety:

"Er... the fact, you know, you should have quite a wide variety of different foods, you shouldn't just eat all meat or fruit or anything, you've got to have everything in moderation, you can't just eat fruit and vegetables all the time because you'll miss out you know may be the dairy section or... and you can also have you know sweet things and things that you might think are slightly fatty, it doesn't matter as long as you have them within a diet with other things as well." (B.31, Q.21)

However some idiosyncratic views were also expressed, which taken literally would counteract variety. So, for the student cited below, taking one food from each sector is enough for securing a balanced diet. A diet consisting of only five foods, though, would not be characterized by variety:

"This is not a plate from which we should eat everything. Sure. We must eat one thing of each category here. Each category represents one substance that we can take, say protein, and every product let's say in category bread and potatoes we may take a substance in the same quantity." (G.12, Q.19)

Eight students (6 Greek, 6 male) did recognized neither proportionality nor variety as the message of the 'plate' and another five students (3 Greek, 3 male) recognized both of those messages.

Seven students (5 Greek, 4 female) saw a message of **quantities** in the 'plate'. Four of them (2 British) spoke clearly about moderation in eating. Greek students preferred the phrase of "small" or "not large quantities". This is a most laconic description:

".... we should include everything in our diet but in the right proportions and quantities." (G.04, Q.20).

Finally, four British students, of whom three were male, saw a **negative message** in the 'plate'. They said that the underlying rationale is to "keep away from certain foods/nutrients". For all of them fat is the nutrient to keep away from, but one of them combined it with junk food and another with meat.

Expressing their beliefs about healthy diet the students had also referred to variety, proportionality and moderation. The contingencies of these features as beliefs and as messages of the 'HEA plate' are represented in tables 33-35.

PROPORTIONALITY				VARIETY				MODERATION			
belief of healthy diet	perceived as a message of the 'HEA plate'			belief of healthy diet	perceived as a message of the 'HEA plate'			belief of healthy diet	perceived as a message of the 'HEA plate'		
	yes	no	total		yes	No	total		yes	no	total
yes	4	3	7	yes	5	9	14	yes	1	10	11
no	18	15	33	no	10	16	26	no	3	26	29
total	22	18	40	total	15	25	40	total	4	36	40
Pearson chi-square = 0.016, p = 0.900				Pearson chi-square = 0.029 p = 0.864				Pearson chi-square = 0.014 p = 0.906			

CROSSTABULATIONS 33, 34 & 35: Features of healthy diet as beliefs and as a message of the 'HEA plate'

6.3.2 Reasoning the message

Can you explain why the orange and the green sectors are larger than the others?

The majority (29) of the students rationalized the form of the 'HEA plate' on the basis of the **composition of foods** found on it. So, for 17 students (13 British, 9 male) it was the content in terms of carbohydrates/starch that justified the large proportions of those two sectors. Another 13 students (7 Greek, 8 female) spoke about vitamins. Ten students (9 British, 6 female) spoke about the fibre contained in these sectors. Seven students (6 British, 5 male) attributed the promotion of these foods to their low fat content. Finally, 3 students spoke about the mineral content and two about the low sugar content. There were also two imprecise reasonings of the nutrient logic: Proteins were discovered by 7 students (6 British, 5 female) in those sectors where the highest content in protein is 6% and is met in rice. Six students spoke about "many nutrients". The precise "composition reasonings" were supported by 29 students.

Physiology of foods was the rationale of the 'plate' for 24 students. Of the specific physiological arguments, the provision of energy was selected by 8 students (4 British, 6 female). Three Greek students stressed the avoidance of becoming overweight, two girls, one British and one Greek, said that this is easily digestible stuff and a Greek student referred to the safeguarding of growth.

Some students had referred to these physiological effects while expressing their beliefs about a healthy diet, but the reference to a specific effect in beliefs was not a predictor of a reference to the same effect when reasoning the 'HEA plate'. Table 36 summarizes this contingency for energy provision.

Energy provision believed to be one objective of healthy eating	Energy provision expressed as reasoning of the 'HEA plate' Yes	No	Total
Yes	3	6	9
No	5	26	31
Total	8	32	40
Pearson chi-square = 1.290, significance 0.256			

CROSSTABULATION 36: Energy provision as objective of healthy diet (belief) and as reasoning of the 'HEA plate'

Composition arguments were mainly used by British students. Nineteen British students used at least one such argument versus ten Greek students only (Pearson chi-square = 10.157, p = 0.001). Seventeen of those 29 students combined the composition argumentation with reference to specific physiological results. Eleven of those were British. The students who referred to physiological effects of the foods bypassing their composition were not very precise. Their reasoning was of the type "it's good for you". All of the students that used this argumentation were Greeks. Finally, 4 students did not use either composition or physiology arguments. In table 37 the contingency of composition and physiology argumentation among the students is shown. The physiological arguments were gathered from the responses given to the specific questions as well as from previous stages of the interviews provided that the nutrients that were mentioned in the specific questions had also been mentioned for their physiology earlier.

Composition arguments	Physiological arguments Yes	No	Total
Yes	**17** (11 B, 10F)	**12** (8B,7F)	**29** (19 B, 17F)
No	7 (7G, 5M)	**4** (3G, 2M)	**11** (10G, 7M)
Total	**24** (13G, 12F)	**16** (9B, 9 F)	**40**

CROSSTABULATION 37: Interpreting the 'HEA plate': Composition * Physiology reasoning. Numbers represent students. G = Greek, B = British, M = male, F = female.

Some alternative reasonings, interesting nonetheless, were also given. For two girls (one British and one Greek) it was the **purity** of these foods the main reason for preferring them:

> "They are sort of natural products, em... you know ...
>
> -*When you speak about natural foods, what do you exactly mean?*
>
> -Like baked beans, you have to put things in, like tomato sauce, unlike potatoes you pick them from the ground and eat them like that or after you have cooked them. Like cheese isn't really... well I know it's natural but you have to do something to it.
>
> -*So the processing of foods is a little bit...*
>
> -Yes you don't know what they put in it, they can add something to it you cannot know about." (B.27, Q.22).

One of those girls (G.13) had earlier expressed her belief in the need for foods to be pure.

Finally, 4 British students saw a meaning of inevitability in the layout of the 'plate':

> "This is a main meal... well... is a more... it is like... they are like... not, well... this all are essential, to make up other bits like this the green section is full of stuff that is essential for people to eat, I mean you can't avoid the green section because everything I eat is involved in that green section, that's why this is the biggest because most people eat that. And the yellow section... almost everyone eats potatoes and potatoes is with something. So with cereals everyone eats cereals, well, most people have cereals in the morning and everyone has bread for lunch. So that's why." (B.26, Q.22)

6.4 Measures of performance

As regards the responses given by the students about the **diseases-targets** of the 'WHO table' two variables were developed: depth and coherence. The **depth** represented the number of identified illnesses included in the list of Section 6.2.1.

Students' responses on this question were also collated to the targets that they named when describing their own perception of what constitutes a healthy diet. The **coherence** of their thought was measured as the number of diseases that coincided in both those answers.

All the statements about the **recommended quantities of nutrients** were categorized as correct or controversial. The following statements were categorized as controversial:

1. Eat fat in general
2. Eat fewer unsaturated fatty acids
3. Eat much cholesterol
4. Eat moderate starch
5. Eat sugar
6. Eat much protein
7. Eat salt.

The **depth** of the students' replies was calculated as the number of nutrients that each student referred to. This variable ranged between 0 and 8, the mean being 3.05 (StD=2.61).

For assessing the **accuracy** of the students' statements about nutrient intakes the ratio of correct to total number of statements was calculated. It ranged between 0.33 and 1.

The translation of the 'WHO table' into **foods** was rated by three variables. The **accuracy** of the students' recommendations was calculated as the ratio of correct to total recommendations. The message that the 'WHO table' attempts to pass on is that the macronutrients should be consumed proportionally. Consequently, those food recommendations were considered correct that signified increased intakes of starch, sufficient intakes of dietary fibre, moderate intakes of fat and protein and minimal intakes of cholesterol, salt and sugar. All the other recommendations were considered as incorrect.

The **comprehensiveness** of students' recommendations, i.e. the number of food groups that they referred to in their recommendations (tables 31, 32), ranged between 0 and 5. The mean for the whole sample was 2.58 (StD = 1.32). The mode was 3, which was scored by 13 students. Three students scored 5.

The **depth** was defined as the number of foods that each student referred to. This variable ranged between 0 and 12. The mean, median and mode coincided at 4 exactly (StD = 2.58). Nineteen students (47.5%) mentioned 3-5 foods while three students (7.5%) did not refer to any food at all. Those students who had previously said that a healthy diet has to be varied (N=14, Section 5.2.1) scored on average 4.86, while those who did not express any belief about variability in diet scored on average 3.54 (Mann-Whitney U = 135, Asympt. 2-tailed significance = 0.178).

Finally, the **depth of reasoning** of the structure of the 'HEA plate' was marked by the total number of correct and precise composition and physiology arguments put forward by the students. This variable ranged from 0 to 3, the mode being 2 (14 students). The mean for the whole sample was found 1.65.

The mean scores for the whole sample, for Greek, British, male and female students, for the above variables are summarized in table 38.

VARIABLE		MEAN SCORES AND STATISTICAL SIGNIFICANCE						
		G	B	Mann Whit. U & p	M	F	Mann Whit. U & p	T
Dis-eases	Depth	1.45	1.35	181, 0.570	1.47	1.33	183, 0.622	1.40
	Coherence	0.60	0.70	194, 0.858	0.68	0.62	193, 0.846	0.65
Nutri-ents +	Depth		3.05		3.00	3.10	192, 0.827	
	Accuracy		0.74		0.71	0.76	185, 0.664	
Foods	Depth	3.55	4.45	168, 0.375	4.16	3.86	182, 0.632	4.00
	Accuracy	0.75	0.67	177, 0.524	0.77	0.65	171, 0.422	0.71
	Compr/ness	2.60	2.55	196, 0.911	2.79	2.38	172, 0.443	2.58
Reason-ing	Depth	1.10	2.20	85, 0.001	1.53	1.76	177, 0.517	1.65

TABLE 38: Mean values of variables describing the mental processes provoked by the 'WHO table' and the 'HEA plate'. (+) Only British students are included in this measurement. G = Greek, B = British, M = male, F = female, T = total.

6.5 Discussion

6.5.1 Recognizing the end from the means, the target diseases of the 'WHO table'

In Section 6.2.1 it was demonstrated that of the 8 target diseases of the 'WHO table' each subject in this study recognized an average of 1.40 diseases. Table 25 shows that this mainly results from their knowledge about the causes of cardiovascular diseases and, to a lesser degree, of obesity. The dietary causation of the rest of the diseases, especially cancer, the second most important cause of death in Greece and Britain alike, passes unremarked from the students, something already noted in Section 5.5.1.2.

Crosstabulations 26 and 27 deal with the most often mentioned target diseases. Two suggestions can be made from them. First, the rudiments of a CVD-low-risk-diet are today much more widely known compared to any other disease or condition. The values of table 26 suggest that only 5 out of 40 students failed to refer to them absolutely, compared to 18 out of 40 who seem to ignore the rudiments of a weight-control-diet. The second is that the recognition of the beneficial effect of the 'WHO table' diet on the circulatory system is more independent of the subject's beliefs on the same subject, compared to the effect of this diet on obesity. The students that have expressed beliefs about the role that diet may have on weight control are more likely to recognize the beneficial role of the 'WHO table' diet on obesity than students who have not expressed such beliefs. Knowledge on obesity appears more relevant to students' concerns and hence more accessible (see Section 5.2.4).

6.5.2 Interpreting the 'WHO table'

The data of the table 28 give us an insight into the way that the British students interpreted the 'WHO table' at a first glance. The first remarkable thing is that just one student commented on the energy limits given on top of the table. However, her interpretation was unilateral. Although there were upper and lower limits she said that we must have "lots of energy". The rest of the students ignored the energy limits. In the countries where this study was carried out, the important thing is not so much the lower limit, as there is no overall shortage of food for most people, but the upper one. In Section 5.5.1 it was suggested that relatively few students recognize the importance of self-restraint in eating. That suggestion is confirmed here by the fact that students did not comment on the energy limits.

The same student who interpreted the figures about energy intakes as the need to have lots of energy also suggested that one of the targets of the table was the avoidance of bulimia and anorexia. One might expect that since she mentioned both of these diseases she would be equally alert of the two extremes of imbalanced intakes.

The values of the 'WHO table' suggest that we should normally have half the energy intake from protein compared to fat. When the energy densities of those two nutrients are taken into account, we end up with roughly equal (moderate) masses of fat and protein recommendations. However, only 3 of the 17 students who referred to protein intakes spoke about moderation in protein intakes. Seven used vague phrases like "we should eat protein", and 6 spoke about the need for large protein intakes, a fact that surely contradicts the figures that they were trying to interpret.

The dialogue about protein cited in Section 6.2.2 gives a probable explanation for this unexpected interpretation:

"Er... protein isn't very high but I thought it was quite important in the diet"

This remark suggests that for some students the quantity of intake ought to be proportional to the importance of this macronutrient:

Very important, follows large intakes.

Students who have adopted the above rationale may have also developed some misconceptions of the type:

1. Vitamins being essential and protective against some diseases should be taken in large quantities.
2. Fat being a nutrient that we should cut down on is not an essential nutrient[1].

Both these beliefs, if put into practice, may have dramatically adverse effects on health (see Sections A.1.1.3 and A.1.2.1). It seems then, that here is an issue that

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[1]In fact this stance was adopted by one girl during the second series of interviews

needs further exploration. Empirical research is needed to investigate to what extent students have developed this kind of thinking, and how it may have affected their way of interpreting data and/or their dietary habits.

From the fourteen students who distanced themselves from the 'WHO table' on protein intakes only one realized it. The rest of them appeared to believe that they had made an uncoloured interpretation of the table. One of the main objectives of science lessons in both the Greek and the British secondary schools appears to be the familiarization of students with tables, charts and other formats for presenting scientific data. The findings of the present study suggest that at the end of secondary education several students interpret scientific information in a way that is not very objective. Is it because they did not approach the data given to them as a "scientific" piece of information, or because they were prejudiced from prior knowledge and beliefs? Whatever the answer, there are implications for nutrition education. Perhaps, nutrition education should be more associated with science education. Furthermore, students' beliefs about healthy eating are a matter that has to be addressed in the classroom. As happens all too often in science education, it is only through challenging students' prior knowledge and beliefs that we can hope to trigger conceptual change (Hewson *et al.* 1984, Posner *et al.* 1982).

6.5.3 Planning a diet

A secondary school graduate is expected to comprehend a simple document expressed in scientific language and recognize its meaning for his/her life. This objective echoes the modern challenges for science education, according to which we should:

> "...promote the assimilation of knowledge through an educational approach ... seeking to establish constant links with real life... This requires us to draw systematically on the real and the tangible and put theoretical notions into practice in everyday life..." (Lietaer 1999, p.56).

The fact that the 'WHO table' deals only with macronutrients does not mean that vitamins and minerals are not essential nutrients. A diet without micronutrients is incomplete. When the students were asked to design a plan for a diet based on the 'WHO table', they were expected to speak about a complete diet, providing for all the essential macro- as well as micronutrients. All the students responded to this challenge including in their plans for a balanced diet fruits and/or vegetables, which are considered as main providers of minerals and vitamins. Some students expressed mainly their own beliefs about healthy eating, some others tried to stick with the 'table' and some others expressed a fusion between these two extremes.

6.5.3.1 Does the suggested diet include the essentials?

The most often mentioned food groups by the students are the 'starchy' and the 'protein' ones. The dairy and the fatty and sugary foods are the least mentioned ones. This result may mean either that the students are not very sure about the nutritional content of those foods (dairy, fatty and sugary) and/or they usually do not consider these foods as essential when planning a diet. To a lesser extent, the same can be said about fruit and vegetable-foods which were introduced in the dietary plan by only 55% of the students (tables 31 & 32).

As mentioned in Section 6.4, only 3 students mentioned all five food groups. Excluding the fatty and sugary foods, which are not essential if some fat is consumed with other foods, the remaining four food groups, which are essential for diet, were mentioned by 6 students out of 40 (15%), whereas each student mentioned on average 2.17 of those groups. This is a consistent finding in all the subgroups of the study, which suggests that the likelihood of it being statistically false is rather low. This is a strong indication that the majority of students have a restricted knowledge of the essentialness of food groups. For instance, omitting dairy foods from diet (as 80% of the students did here) means restricted intakes of calcium and possibly of vitamin A. Omitting fruits and vegetables (45% of the students did) means eliminating from diet the main fibre and vitamin providers. In other words, it appears that the large majority of students have not realized that a balanced diet should contain foods from all the essential food groups.

6.5.3.2 How varied and sound is the proposed diet?

Table 32 suggests that the group of foods from which students mention the largest variety of foods is the starchy one. Each student who referred to this group mentioned on average two foods. These foods were mainly bread and potatoes and they were mentioned twice as many times as pasta, rice and cereals together (table 29). From the protein sector each student mentioned on average 1.5 foods, usually meat. Particular types of meat, meat products and legumes together were named 19 times and "meat" alone 25 times. The green sector was mentioned either as vegetables or fruits, or as both. However, no specific category of particular fruit or vegetable was mentioned; neither were they grouped by their colour or flavour. Vegetables were mentioned 20 times whereas fruits only 8 times. The students did not refer to beverages at all.

It appears that students are likely to use collective names for the green sector and for meats. To what extent they had in mind a variety of these products is difficult to say. Variety within food groups, however, is quite essential. Different vitamins and minerals are contained in different fruits, vegetables and meats. It is possible that some students believe that eating one food from each food group is enough to provide one with all the essential nutrients. One student did indeed express this attitude (see citation G.12, Q.19 in Section 6.3.1).

Some students, however, insisted that some kinds of meat should be preferred over other ones. For these students the protein sector consists of distinctive foods. And these foods are not always equivalent as the following excerpt shows:

> "... I don't think you should be eating a lot of meat, I mean have some, I mean like red meat apparently is bad for you, so you may cut down and have chicken, it's good for you, you are getting your proteins, from there, fish, we should be eating fish..." (B.28, Q20)

One more reason that suggests that students may have not perceived the need for having a variety of foods from each food group is the fact that only 10 of them (25%) mentioned foods that are considered as protein providers other than meat.

As for the overall variety of named foods, it can be characterized as restricted. The 'HEA plate' contains 40 foods whereas in this study the maximum number of foods mentioned by any student was 12, the average number being just 4.

Students were generally accurate as 7 out of 10 of their recommendations were correct (Section 6.4). Greek students appear to have made slightly more correct recommendations than their British counterparts. The recommendations that were considered as **controversial** were mainly two: 'cut down on starchy foods' which was supported by 70% of the Greeks and 'eat/eat much meat, chicken and eggs' which was supported by 68% of the British (table 29). This particular controversial recommendation appears to be a well-rooted attitude for British students because, as was stated in Section 6.5.2, they seem to believe that large quantities of protein are beneficial in our diet, a belief that was hardly challenged by the figures of the 'WHO table' which suggest the opposite.

The overall impression from the result of this exercise is in harmony with the findings of another survey (Parmenter *et al.* 2000) where it was found that although "people performed fairly well on the food choice section indicating that they can translate their knowledge into actual choices ... they seem to be poor at spontaneously generating guidelines for healthy eating..." (ibid p.170).

6.5.4 Recognizing and reasoning a message

The obvious messages from the 'HEA plate' are that our diet should be both proportional and varied. This was recognized by the majority of the students (Section 6.3.1). Crosstabulations 33-35 show the possible effect that materials like the 'plate' may have on students: proportionality was believed to be a general feature of good diet for only 7 students before the display of the 'plate' (Section 5.2.1). After this display their number tripled. Variety was perceived as the message of the 'plate' by almost the same number of students as those who believed in the need for variety in diet. Few students discerned a message of moderation in such a loaded plate. This is not an unexpected finding. There is evidence that people eat more when presented with a variety of foods (Guthrie 1994, p. 1814S). Perhaps there exists a kind of incompatibility between the imperatives of variety and self-restraint; when the first is stressed, the second subsides. The findings presented in crosstabulation 35 might be interpreted in the light of this hypothesis.

The fact that some students did not recognize the obvious **messages** on the 'HEA plate', in conjunction with the fact that some of those who did interpreted it in a way that constituted a distortion of the actual proportions (Section 6.3.1), suggests that if we want to maximize the learning effects of such materials we should use them only as starting points. Discussion and additional information are necessary for triggering conceptual change. The findings of this research suggest that cases of spontaneous conceptual change like the single one described in Section 6.3.1 (G.04) are not the norm, but the exception.

The students generally gave **positive reasonings** about the priority that fruits, vegetables and starchy foods should have in our diet. The majority of them spoke about the need to have enough starch, vitamins and fibre and about the beneficial effects that this type of diet may have, like energy provision, weight control and growth (see Section 6.3.2). This kind of reasoning is in harmony with their perception of positive health and with the perceived targets of a healthy diet which were found to be predominantly positive (see Sections 4.2.2, 4.4.2, 5.2.2 & 5.5.1.1). Only a few of them said that by having a diet rich in these foods we cut down on fatty and sugary foods and none of them associated the protection that these foods offer against diseases of the circulatory system or against cancers of the digestive system. This is not very surprising: in the analysis of their beliefs concerning the type of diet that prevents CVD it was found that they spoke mainly of foods that we should not eat and scarcely about the foods that we should eat (see Section 5.5.1.2).

A sound explanation of the 'HEA plate' pattern should normally include a reference to:

1. the nutrient profile of each sector (see Section 1.3.2) and
2. the physiology associated with the specific profile.

In table 37 it is shown that seventeen out of forty students did include references to both these factors. Another twelve students based their explanations on simple composition arguments. Some of these twelve students may simply have omitted to express their beliefs about the physiologic effects of the nutrients, but some others may have developed a dichotomic conception of bad and good nutrients. In fact one of those students described healthy diet as follows:

"*And what about the orange sector*?

There is more carbohydrate than the green one, ... quite healthy food, like you know, pasta rice, bread, potatoes and cereals" (B.24, Q.22).

However, one young man who followed this type of explanation had earlier expressed his differentiation on the labeling of nutrients:

"It's like a stereotype which is like eating salads, and you know all the healthy foods, low in sugar and fat I think, but... that can't be good for you, you have to have some amounts of sugar, you have to have some amounts of fat, so it's just eating... be careful of what you eat, not eating things that can be bad in excess... just be really careful of what you are eating really." (B.29, Q.14).

Nevertheless, the important finding in the way that students reasoned the arrangement of the 'plate' is that 3 out of 4 them found it necessary to use compositional arguments. This ratio spirals to 19 out of 20 for British students and shows that scientific language, i.e. nutrients, is a convenient concept for argumentation in this field for the majority of secondary school undergraduates.

All seven students who based their reasoning only on physiology arguments without referring to food composition were Greeks. This is hardly surprising if we bear in mind that:

1. Greek students speak in terms of foods more often than British students who prefer to speak about nutrients (Section 5.2.2),
2. British students appear to have a higher level of knowledge on physiology and composition of food (see table 24) and
3. Greek students appear to maintain controversial beliefs about the physiology of starchy foods (Section 6.5.3.2).

All these factors may have combined so that Greek students had difficulties in giving a sound explanation for why the starchy sector is so large. The fact that British students are significantly more articulate from Greeks in explaining the layout of the 'plate' (table 38) may not be independent of their ability in using nutrient arguments.

Only two students explained the layout of the 'plate' in terms of **food quality**, by portraying fruits, vegetables and cereal-based foods as pure and having no need for preservatives or other additives, which to some extent is a plausible attitude. This relatively small number of students strengthens the significance of the finding presented in Section 5.5.1 according to which not many students consider food quality as a prerequisite for a diet to be healthy.

The "inevitability" that some students mentioned may be interpreted in two ways. The optimistic one, according to which the students live among people who have acquired dietary habits similar to those recommended in the 'HEA plate', and the pessimistic one according to which those students either have not acquired the skill to analyze diet or have confused the proportions of food with proportions of people. The expressions used by two out of the four students that mentioned inevitability supports the second explanation:

> "I think most people will have a sandwich toast in the morning or a sandwich at lunch time..." (B.21, Q.22)

The second case (B.26, Q.22) is cited in Section 6.3.2. For these students the 'plate' does not carry a quantitative meaning. It's about the likelihood of meeting some foods in somebody's diet.

The message of the 'HEA plate' is not unilateral. However, the majority of the students in this research did not grasp its pluralism, as the measures of performance reveal (see comprehensiveness of perception and explanations in Section 6.4). British students excel Greek students in this field. In Section 1.6.3 it was suggested that nutrition education in British schools seemed to have (potential) advantages over the Greek approach with regard with the scope of issues covered and the way that it is scheduled across the stages. These advantages seem to be reflected in the performance of the students. The different performances should not be attributed absolutely to education though. Female students, for instance, were considerably more inventive in explaining the rationale of the 'HEA plate', a fact which can be attributed to social norms (diet care is more often a matter for women rather for men). In terms of pure knowledge however, which can be more readily attributed to school education, the British students outperformed their Greeks counterparts. The British students did not just prove more knowledgeable but they also proved to be able to use this knowledge in order to substantiate their reasonings. 55% of the British students showed this type of thought versus 30% of the Greek students (see table 37).

The obvious conclusion is that the utilization of materials like the 'HEA plate' in the classroom should not be based on only one consideration. For instance, it's not enough only to stress that a diet like this secures the provision of all the essential nutrients, or just to point out the positive effects that this type of diet may have on health statistics of a society etc. A balanced diet can be justified on the grounds of avoiding ill-health, promoting good health, securing growth, offering more choices, increasing enjoyment from eating etc.

6.5.5 Consistency between beliefs and reasoning

Crosstabulations 33-35 suggest that the beliefs that the students maintain about the properties of a healthy diet did not play a significant role in making sense of the 'HEA plate'. Proportionality, for instance, which is the most obvious message of the table, was mentioned as a message by similar ratios of students across the two groups of those who had mentioned proportionality as a property of healthy diet and those who had not mentioned it. The same can be said about variety and moderation. In other words, the expressed beliefs about healthy diet were not predictors of the performance of the students in this exercise.

Similarly, those students who pinpointed energy provision as a target of healthy eating were not considerably more likely to attribute the message "priority to the starchy foods" of the 'HEA plate' to their energy content, compared to the students who had not chosen that target (see table 36). The weak positive correlation was not statistically significant.

If these findings suggest something, it is that for the majority of the students the properties and the targets of the healthy diet that they referred to cannot be characterized as deeply rooted beliefs. If they were, they would be more easily accessible. Somebody who believes, for instance, that proportionality should play a crucial role in diet is expected to recognize that the 'plate's' outstanding message is about proportionality.

It would be unfair, though, to conclude that beliefs about healthy diet did not make any difference whatsoever to students' performance. For instance, although the different sub-groups of the sample did not appear to make significantly different numbers of recommendations in the question of devising a diet (see foods' depth, table 38), those students who had already expressed the view that we must have a varied diet made 37% more recommendations compared to the rest of the students (Section 6.4).

Comparing tables 22 and 31 we can see that there is a kind of analogy in the numbers of students that referred to each nutrient when speaking about their beliefs and the numbers that mentioned the main providers of these nutrients, when making food recommendations. For instance, starch was mentioned by most students as a nutrient with specific physiological effects and starchy foods were mentioned by most students when planning a diet. Similarly, the second most often mentioned nutrient is protein and the second most often mentioned food group is meat and alternatives. This may not be an accidental finding. In fact, it may be an indication that knowledge of nutrients, and by this is meant knowledge of where they are found, facilitates the recall of foods.

The role that the understanding of nutrients can play in the planning of diet is also foreshadowed in the statistics of table 30. We see there that students who recommend fibre intakes make more recommendations of fruits, vegetables and starchy foods compared to the students who do not recommend fibre intakes. Such correlations are also in the expected direction for protein and starch recommendations and although none of these correlations was found statistically significant, perhaps due to the small sample (20 British students), the fact that all they were found as expected, is one more indication of the positive impact that the knowledge of nutrients may have on diet planning, i.e. knowing the nutrients and the composition of foods may indeed help some people to make sound choices of foods.

In Section 1.4.1 the two strategies of nutrition education were discussed, the one focusing on nutrients and the one focusing on foods. The findings discussed in the previous paragraphs suggest that for young people who have had some formal education on the composition of foods, the logic of nutrients may help them to choose foods wisely, provided they decide to make this choice. But not all the students who use the nutrient logic have a sound knowledge about them. In Section 6.5.2 it was discussed how persistent and questionable were the ideas that most British students shared about proteins. These ideas were reflected in their food choices as the findings in table 30 show. It can be concluded then that the nutrient logic is indeed constructive and can play a functional role but it is to the benefit of its user only when it is based on sound knowledge of nutrients' physiology.

6.6 Conclusion

The findings presented and discussed in this Chapter are summarized here. Many of these findings **corroborate** findings discussed in Chapter 5.

1. For most of the English and Greek students, female and male, the diseases of the circulatory system are the ones that are readily recalled as diet-related diseases, while other ones like cancer, anaemia and dental carries are not readily recalled as diet-related.

2. Moderation in diet is recognized as an important property of a healthy diet by only a few of the students.

3. Students' ability to plan a sound diet was characterized by high accuracy, but low comprehensiveness, as many of them failed to name foods from all the essential food groups. High accuracy but low comprehensiveness also characterized their beliefs about what constituted a healthy diet.

4. The recommended high intakes of fruits, vegetables and starchy foods were not related to the protecting effect that these foods may have on several common illnesses. Similarly, one of the conclusions of Chapter 5 was that for the avoidance of CVD students only mentioned foods that we must avoid. It therefore appears that students associate the foods that must be eaten in large quantities with good health and the foods that must be eaten moderately with diseases.

5. One field where British students appear better educated than their Greek counterparts is that they appear more versatile and inventive to rationalize information about diet. This ability of the British students may be attributed to their better knowledge on food composition.

6. Food quality is not an important issue for the majority of students.

Certain **views** of the students on the physiology of diet are strongly held and some other less so:

- Ideas about the intakes of the different nutrients, no matter how correct, have a tangible impact on the way that students understand the planning of diet and on the way that they interpret informative materials like charts or tables that refer to diet. Sometimes these ideas are so strongly held that students interpret these materials in a most idiosyncratic way.
- Care for weight control and to a lesser extent the avoidance of CVD are pivotal concepts (not necessarily concerns), through which the students explain the usual dietary recommendations.
- Variety and proportionality in diet are occasionally mentioned by many students as attributes of a balanced diet. Those students that mentioned variety named on average more foods when they were asked to devise a diet, compared with the rest of the students.

Apart from the idiosyncratic way in which some students interpreted the 'WHO table', it was found that some of them experienced **difficulty** in making sense of this type of scientific notation. So they could not appreciate the figures which revealed that unsaturated fatty acids are to be preferred over saturated fatty acids. This difficulty may, though, possibly be attributed to the psychological pressure of the interview.

In the light of the findings of Chapters 5 and 6, the following suggestions for nutrition education are made:

- Widening of the meaning of health, so as, apart from the bodily element, to include psychological, aesthetic, environmental and social aspects would help students to understand better the rationale of a balanced diet.
- More comprehensive instruction on diet-related diseases with emphasis on cancer and on diseases or conditions that affect adolescents is needed to rectify the apparently poor information of students on this area.
- There is a need to strike a balance between negative and positive recommendations (i.e., what to eat and what to avoid) in nutrition education.

- The importance of moderation in the diet has to be stressed in combination with the need for variety. Students should be cautioned that too great an emphasis on variety may eclipse concern for moderation.
- The fact that what is essential in our diet does not necessarily have to be consumed in large quantities should also be discussed in the classroom.
- Students should develop skills to improvise a nutritious diet and interpret messages about diet. A tactic that can help in the development of such skills is the interpretation of the meanings of words like variety, moderation and proportionality in practical terms.
- The technique of conceptual change should also be deployed in nutrition education, as it seems that many students hold certain intuitive ideas that make them misinterpret messages and facts concerning nutrition.
- Nutrients should have a special position in the above-mentioned techniques, as they appear to facilitate learning, provided that the age of the students permits this kind of approach.

Two questions concerning the way that people think about diet might be further investigated:

- How common is the belief that the importance of a nutrient is proportional to the quantity that it must be consumed? This misconception has characterized some students' understanding of healthy eating in the present study.
- To what extent does the belief that a healthy diet should be characterized by moderation subside when the need for variety in diet is stressed? Some weak indications for this possibility were found in the present study.

Chapter 7: HEALTH-RELATED HABITS

7.1 Introduction

This Chapter deals with those habits of the students that have an impact on health, especially diet. The belief that diet is such a habit is shared by the majority of the subjects of this study (see table 5).

Most of the theories discussed in Chapter 2 propound the view that change of habits is the outcome of the formulation of positive attitudes. Social cognitive theory, however, puts forward a more holistic model, according to which the individual and his/her environment and behaviour are in continuous interplay (Section 2.2.1). The analysis that follows leans on SCT in that it does not seek to determine the origins of habits exclusively among attitudes. So, what matters here is the comparison of professed beliefs and stated practices, without attempting to attribute the second to the first or vice versa.

The practices that were examined were not limited to eating habits. Looking into the way that people understand healthy diet can be separated neither from their understanding of health (Chapter 4), nor from their commitment to health prevention and promotion, because, according to SCT, it is not only attitudes that affect a person's behaviour, but his/her behaviour also affects his/her attitudes. In an attempt to draft the participants' General Health Motivation (Section 2.2.3), which, according to HBM, is one of the modifying variables determining peoples' health-related behaviour, the participants in this research were asked a few questions referring to their hobbies and their precautions against ill-health. Health motivation is not reflected only in our practices that aim at disease prevention, but also in our overall lifestyle (see Section 1.2.2, figure 1). It is understood that these two factors (precautions and hobbies) are not enough to portray precisely the General Health Motivation of the students, but in interviews dealing primarily with the understanding of a healthy diet, more questions on this issue would have been excessive.

The question about hobbies was included because people at this age are often characterized by liveliness and their lives' constraints are not yet so pressing as to deter them from being involved in hobbies. So, for persons of this age involvement in health-promoting hobbies is a realistic possibility and may indicate positive health attitudes and/or the establishment of long-term healthy habits (Aarts *et al.*, 1997).

The reported habits will be analysed with a view to providing answers to the following questions:

1. To what extent do students' health-related habits reflect their perceptions about health?
2. In what terms do students describe and characterize their own diet?
3. To what extent does their care about diet reflect their beliefs about food?

It is stressed that this study did not seek for a comprehensive description of students' habits, as its focus was more on their beliefs. The questions about habits were posed at the beginning of the interviews so that the students would be spontaneous. If questions about beliefs and knowledge had come before, they might be tempted to shape what they said about their habits so as to fit their ideas about beliefs and knowledge.

The methods of analysis and the way of presentation of the findings are those followed in Chapter 4. These methods and ways of presentation appear in Section 4.1.

7.2 Health-related habits except diet

7.2.1 Hobbies and interests

Which are your hobbies?

The hobbies of the students were categorized into four categories. The first category included intellectual hobbies like reading, (playing and listening to) music, fine arts and technology. The second group included the energetic hobbies like sports, exercise and outdoor activities. The third group included hobbies that characterize our times like watching cinema and TV, and shopping. Finally the fourth group included habits like friendship, socializing and charities. Table 39 summarizes the numbers of students that declared hobbies from these categories, analysed by nationality and gender.

GROUPS	ENERGETIC Hobbies N	ENERGETIC Hobbies %	INTELLECTUAL Hobbies N	INTELLECTUAL Hobbies %	FILMS, TV, & SHOPPING N	FILMS, TV, & SHOPPING %	SOCIALIZING N	SOCIALIZING %
Greek (N=20)	15	75	16	80	4	20	2	10
British (N=20)	18	90	10	50	8	40	9	45
Male (N=19)	17	90	11	58	5	26	7	37
Female (N=21)	16	76	15	71	7	33	4	19
Total (N=40)	33	83	26	65	12	30	11	28

TABLE 39: Hobbies of the students. Numbers and percentages.

Energetic and intellectual hobbies are the most popular ones. More Greek students declared having intellectual hobbies compared to British ones (Pearson chi-square = 3.956, $p = 0.047$) and more British students declared social hobbies compared to Greek ones (Pearson chi-square = 6.144, $p = 0.013$. Due to small numbers the importance of this statistic indicator is limited). None of the rest of the differences was found to be statistically significant. Fifteen students (9 British, 10 male) declared that they exercise strenuously. On average each student declared hobbies from 2.05 categories, with British students showing greater variety in their hobbies (2.25 categories) than Greeks (1.85 categories).

The number of categories of hobbies that each student was involved in was correlated to the comprehensiveness of their perception of health (Sections 4.2, 4.4.2). For the whole sample there was a weak correlation which was not significant.

Reported exercise and strenuous exercise were related to the fitness perception of health (Crosstabulations 40, 41). Simple exercise was weakly associated to fitness-perception of health. There was however a stronger correlation between strenuous exercise and fitness-perception of health which approached statistical significance.

Fitness as a property of health	Exercise as hobby Reported N	Exercise as hobby Not reported N	Strenuous athletic habits Reported N	Strenuous athletic habits Not reported N	Total N
Selected	20	2	11	11	22
Not selected	13	5	4	14	18
Total	33	7	15	25	40
	Pearson x^2= 2.395, $p = 0.122$		Pearson x^2= 3.259, $p = 0.071$		

CROSSTABULATIONS 40, 41: Fitness as property of health * Exercise as acquired habit. Numbers and percentages represent students

7.2.2 Precautions against illnesses

Do you take extra care to protect yourself against those diseases or any other one?

Twelve students (9 Greek, 6 male) answered that they took some sort of protection against diseases. Six said that they protected themselves against cold. Four students said that they used to visit the doctor regularly and have the necessary vaccines. Three students (all male, two Greeks) said that they were protected against AIDS, a Greek girl spoke about keeping the rules of hygiene and finally just one student said that she protected herself against heart problems:

> "I don't care about AIDS because the issue is not on the agenda yet, so I take care of my diet as much as possible, by avoiding some fried foods, some foods like that.
>
> *But are you afraid of any special disease?*
>
> I am a little afraid of heart disease, because my father died from that and, generally, my relatives on my father's side had problems with their hearts and I'm afraid that I might be affected" (G.11, Q.9)

Twenty-eight students initially declared that they took no precaution against any disease, as a reply to Q.9. However, in the course of the interview 12 of these said that they avoided abuses: 10 professed to being non-smokers, 5 alcohol conscious, 2 drug abstainers, 1 avoider of "any kind of extremes" and 1 "pollution avoider". Another 4 said that they had at the time of the interview or in the past some kind of prolonged treatment for Turner's syndrome, sight problems, leukaemia or heart disease.

This is how a Greek student described the way that he deals with alcohol:

> "...well I have no problem with smoking and I wish I never have, but perhaps sometimes I go out for the night and drink. I don't know. I think this isn't a problem because I don't do it too often, only seldom. Not every Saturday, once every month.
>
> *-How much do you drink?*
>
> -Say, three glasses. Not whisky, I don't like it. Anything else... vodka... three or four glasses, until I start feeling dizzy, just before that, when I start feeling the difference." (G. 06, Q.5)

Two contingencies were examined. The first contingency (table 42) showed that students that define health negatively (Section 4.2.2) are less likely to take health precautions than those who define health only positively but this did not approach statistical significance. The second contingency (table 43) showed that students who believe that illnesses are caused by bad habits are significantly more likely to say that they avoid bad habits than are those students who have not expressed such belief.

Perception of health	Health Precautions		Total
	Reported	Not reported	
Negative	11	9	20
Only positive	13	7	20
Total	24	16	40
Pearson $x^2 = 0.417$, $p = 0.519$			

CROSSTABULATION 42: Negative perception of health * Taking health precautions. Numbers represent students

Illnesses are caused by bad habits	Avoidance of health abuses		Total
	Reported	Not reported	
Declared	11	17	28
Not declared	1	11	12
Total	12	28	40
Pearson $x^2 = 3.832$, $p = 0.050$. Limited importance due to small numbers.			

CROSSTABULATION 43: Illnesses as causes of diseases * Avoiding health abuses. Numbers represent students

7.3 Diet

7.3.1 Preferences

Tell me about your likes and dislikes in food. (Series 4)
Tell me what foods you usually eat in the main meal of the day.
What do you usually take for breakfast?
Tell me about your likes and dislikes in foods (Series 5).

Although the question addressed to the Greek students (series 4) was about food preferences, many students ended up speaking about their actual dietary habits. In series 5 the distinction between actual diet and preferences was made clearer. However, the distinction between preferences and actual diet is not always an easy one to make. Some students used the verbs "to like" and "to eat" indiscriminately:

"I don't like greasy food, oily foods and I don't eat a lot of fruits, I don't eat fruits (B.33, Q.12).

The sectors of the 'HEA plate' (Section A.2.2.1) were used to group in categories the students' sayings about their preferences and actual diet.

PREFERENCE & FOOD GROUP		GREEK N=20		BRITISH N=20		MALE N=19		FEMALE N=21		TOTAL N=40	
		No	%	No	%	No	%	No	%	No	%
Like	Green	5	25	4	20	7	37	2	10	9	23
	Starchy	10	50	3	15	5	26	8	38	13	33
	Protein	4	20	5	25	4	21	5	24	9	23
	Dairy	0	0	2	10	1	5	1	5	2	5
	Fat. & Sug.	4	20	4	20	5	26	3	14	8	20
Selective	Green	0	0	4	20	1	5	3	14	4	10
	Starchy	0	0	1	5	0	0	1	5	1	3
	Protein	6	30	2	10	4	21	4	19	8	20
	Dairy	0	0	1	5	0	0	1	5	1	3
	Fat. & Sug.	0	0	0	0	0	0	0	0	0	0
Dislike	Green	7	35	3	15	3	16	7	33	10	25
	Starchy	0	0	0	0	0	0	0	0	0	0
	Protein	3	15	5	25	3	16	5	24	8	20
	Dairy	0	0	0	0	0	0	0	0	0	0
	Fat. & Sug.	0	0	2	10	1	5	1	5	2	5
No mention	Green	8	40	9	45	8	42	9	43	17	43
	Starchy	10	50	16	80	14	74	12	57	26	65
	Protein	7	35	8	40	8	42	7	3	15	38
	Dairy	20	100	17	85	18	95	19	91	37	93
	Fat. & Sug.	16	80	14	70	13	68	17	81	30	75

TABLE 44: Students' foods preferences. Numbers and percentages represent students.

The **likes and dislikes** of the students are presented in table 44. The protein group is the most often mentioned group, and after this the green sector. The least mentioned is the dairy foods sector, with the fatty and sugary foods second. Starchy foods (rice, pasta, potatoes and bread) are the most often mentioned as favourite foods, although one student said that he disliked spaghetti. The foods of the protein sector appeared to be liked, disliked and partly liked from similar numbers of students. It is surprising that only 8 students declared sugary and fatty foods as favoured. 25% of the students spoke about disliking foods in the green sector which is the group with the greatest number of students disliking its foods. When selectivity and distaste are put together, though, the protein sector leads with 40% of the students with the green sector a close second with 35% of the students.

As for differences in preferences between the subgroups of the sample, a notable one was between male and female students in the green sector, with 48% of the girls saying that they dislike or partly dislike foods from this sector against 21% of the boys (Pearson $x^2 = 3.095$, $p = 0.079$). Another difference exists between Greek and British subgroups in the starchy sector: 10 Greek students (50%) mentioned favourite foods from this sector versus only 3 British students (15%) (Pearson $x^2 = 5.584$, $p = 0.018$, limited importance due to small numbers).

Coming to **specific foods**, a notable finding is that of the 23 students who referred to the green sector just four of them spoke explicitly about fruits, all of them being female and three of them British. The most popular from the starchy foods appears to be pasta, with 9 fans, then comes rice and potatoes with 3 fans each and sandwiches (bread) with two fans.

From the protein sector, meat (not including fish) was the food which students referred to most frequently. Ten students said that they generally like meat, but 4 of them said that liked some kinds of meat only. Five students said that they do not like meat or some kinds of meat. The disliked meats are lamb (3 students), beef (2 students) and pork and chicken (1 student each).

In one case a likely reason for disliking beef was given:

> "-I don't eat beef...
> *-Is it something that you don't like or you are afraid...?*
> -I would say it's mostly dislike because I did have a hamburger once and I got a food poisoning from it and that has something to do with it, but...
> *-It's a trauma then*
> (Laughs) I've not eaten for a year now". (B.21, Q12).

One student declared herself a total meat abstainer:

> "I don't like meat and I don't like vegetables, I don't eat meat at all, I don't eat any vegetables, I do like chips, roast potatoes, sweet corn, cheese, bread, pasta, lettuce, celery and vegiburgers, which are all

vegetables but being a burger."

She also tried to explain why she dislikes meat and vegetables:

"I don't eat meat or vegetables because I had a bad reaction when I was a child, so I have a funny diet, I usually eat potatoes, pastas, bread, cheese and I eat sweet corn, lettuce and I have vegetable substitutes like vegiburgers...

-Why you said that you avoid vegetables?

Because, I don't know, when I was a child my mum used to give me eat them minced or something but by the time I got to three I just wouldn't have it, I just kept throwing it back up to her, I kept vomiting that she shouldn't give it to me completely, and I haven't eaten meat since then or vegetables." (B.24, Q10)

Four students said that they liked fish and 5 said that disliked it. Finally, just one student said that he eats legumes and six said that they do not like either all or one kind of them. Of the 7 students who referred to legumes 4 were Greeks and one British and of Greek-Cypriot origin.

The 'liked' foods from the 'fatty and sugary' sector were: sweets (4), oily and fatty foods (3), French fries (2), fast food (2) and pizza (1). Of those only the first three categories can be categorized straightforwardly in this sector. The last two were categorized in the fatty and sugary sector because they usually, though not always, contain much fat. The 'disliked' foods from this sector were called "oily" by the Greeks, and "greasy" and "rich" by the British students.

Other likes and dislikes that were outside the scope of the 'HEA plate' included **ethnic** cuisine. Only British students referred to this. Two of them said that they liked ethnic food and another two that they preferred "British foods to foreign". **Spices** were also a matter for discussion. Four British students raised this, two of them saying that they liked spicy foods and the other two that they did not. Three of those students had also raised the issue of ethnic cuisine. One student expressed his preference for '**simple and also not too rich foods**' and one Greek girl said that she generally preferred oven-cooked food. Finally 11 students (6 Greeks, 7 boys) said that they liked **any food**, though some of them added some exceptions to this rule.

7.3.2 Actual diet

The actual diet of the students was also standardized for description along the five sectors of the "HEA plate". As mentioned earlier the questions about actual diet were added in the schedule of the 5th series only (used in England), but many Greek students gave data about their dietary habits without being asked about them. The answers of the Greek students to Q.10 that included the verb "to eat" were interpreted as denoting both liking and eating the relevant foods. For instance, 'vegetables' in the answer:

> "No problem. I eat legumes; I eat lots of vegetables, quite a lot, since I was a child. I don't ask for meat often. Well, I eat it; I have no problem with it, but (I eat) vegetables all the time. There is always salad on the table. I don't like some sorts of fishes." (G.06, Q10)

were indexed as both likable and consumed. The answers of the students are presented in table 45. Due to the difference in the schedule of interview used in the two series, differences between the Greek and British sub-samples will not be discussed.

The **sectors** that contain the most frequently **mentioned** foods are the meat and its alternatives and the starchy ones. The green sector comes up less often and the dairy is the least mentioned sector. The starchy sector is not avoided by any student. The protein sector, on the other hand, appears to have the greatest number of selective students. The low mentioning of the dairy sector should not be interpreted as denoting low intakes from the relevant foods, as many students said that they have cereals and sandwiches, foods usually combined with or containing dairy products. On the other hand, the low numbers of students mentioning foods from the 'fatty and sugary' sector is surprising.

As for **specific foods**, again the students spoke more often about vegetables than fruits. From the 18 students who mentioned the green sector in their dietary habits only four referred to fruits and two of them only after a specific probe. From the 15 students who spoke about vegetables only 3 of them named which ones they eat. Two of them did so in order to emphasize the variety of greens that they eat and one to denote that she is selective about them. In contrast to the foods of the green sector, the foods of the starchy sector were itemized: 12 students said that they eat cereals, 9 potatoes, 7 pasta, 5 toasts, 5 rice, 4 bread and just one biscuits. The protein sector fared better than the green but not as well as the starchy one regarding the specification of foods. The term "meat" was the most common reference. This word is sometimes used to denote the flesh of any kind of animal, sometimes the flesh of land animals and sometimes the flesh of quadruped animals only. It was used by 15 students in the description of their diet of whom only 6 specified the meat eaten. Eight students spoke about chicken, 4 about fish and one for each of the following categories: beef, pork and sausages. Legumes were named by 5 students: two abstainers and two vegetarians. The last two were the ones to define the type of legumes: lentils, soya and beans.

EATING BEHAVIOUR & FOOD GROUP		GREEK N=20		BRITISH N=20		MALE N=19		FEMALE N=21		TOTAL N=40	
		No	%	No	%	No	%	No	%	No	%
Eat	Green	2	10	8	40	6	32	4	19	10	25
	Starchy	1	5	13	65	7	37	7	33	14	35
	Protein	1	5	5	25	4	21	2	10	6	15
	Dairy	1	5	2	10	3	16	0	0	3	8
	Fat. & Sug.	0	0	3	15	2	11	1	5	3	8
Selective	Green	1	5	6	30	2	11	5	24	7	18
	Starchy	0	0	6	30	2	11	4	19	6	15
	Protein	4	20	11	55	7	37	8	38	15	38
	Dairy	0	0	4	20	2	11	2	10	4	10
	Fat. & Sug.	0	0	6	30	2	11	4	19	6	15
Avoid	Green	1	5	0	0	0	0	1	5	1	3
	Starchy	0	0	0	0	0	0	0	0	0	0
	Protein	0	0	1	5	0	0	1	5	1	3
	Dairy	0	0	0	0	0	0	0	0	0	0
	Fat. & Sug.	1	5	0	0	0	0	1	5	1	3
No mention	Green	16	80	6	30	11	58	11	52	22	55
	Starchy	19	95	1	5	10	53	10	48	20	50
	Protein	15	75	3	15	8	42	10	48	18	45
	Dairy	19	95	14	70	14	74	19	91	33	83
	Fat. & Sug.	19	95	11	55	15	79	15	71	30	75

TABLE 45: Students' actual diet. Numbers represent students and percentages.

The 'fatty and sugary' sector was mainly mentioned by British students. The foods named were mainly fried food and especially potato chips. One Greek student was very eloquent in her rejection of this sector:

> "I eat anything but I avoid fats, fried things, many sweets. I avoid them." (G.10, Q.10)

This rejection appears much more mild in another interview:

> "Pasta, potatoes, meat, chicken, chips sometimes, things like that." (B.23, Q.10)

And sometimes rejection becomes indulgence:

> "It is a balanced diet I usually have things like pasta, chips etc; things that are healthy but at the same time are not so healthy, so they taste nice, so you get enjoying of both. So, I will never get anything as healthy but doesn't taste nice. It has to taste nice for me to eat it." (B.25, Q.10)

Sometimes we have to pay a price for an indulgence:

> "... a healthy diet is not eating chips every day, which I sometimes do at lunch because it's like the cheapest thing, cheap and like just go down to the local shop ...
>
> *-Is it filling as well?*
>
> -It is actually.
>
> *-It is.*
>
> -It is, but after I'd eat, I'd always feel sick when you're hungry and you think "yes, yes I'm going to eat it ..." then after a little while it's like... I know that's not good at all." (B.34, Q.14)

Strangely enough, students did not speak about sweets.

Ethnic cuisine was raised by 4 students. One of them was half Polish, two were of Indian origin and one was Vietnamese. Their attitudes ranged from outright approval:

> "For dinner my mother makes bread with lots of fibre in it it's an Indian type of bread and she makes lentil soups, lots of them, they help with fibre, they have roughage and lots of vegetables, vegetable dishes, mainly sprouts, just green vegetables because they are good for you, things like that." (B.30, Q.10)

to critical acceptance:

> "I tend to consume ah ... a variety depending, I mean the thing is because I'm an oriental, we have an oriental diet and it does consist of a lot of vegetables. The really bad fact with Chinese or oriental food is that some of the time it does contain a lot of oil, so even I mean the

vegetables we are also intaking oil with it or fat which is bad for you." (B.35, Q.10)

As far as the **breakfast** is concerned, from the 20 British students who were asked 12 said that they consume cereals, toast is eaten by five of them, three of them eat dairy foods, and five have tea or coffee. One said that time permitting she gets a cooked breakfast and finally only three students said that normally they do not take any breakfast at all.

7.3.3 Students' profile of diet

Students were also asked to draw the **profile** of their diet using the statements from the palette given to them. These statements represented different degrees of commitment to a healthy diet. Their answers are summarised in table 46. The students could choose more than one statement.

Which of the following sentence(s) describe your eating habits:

a. I eat whatever and whenever I want.
b. I just eat when I feel hungry.
c. It's a very important thing for me to enjoy what I eat.
d. I just eat and keep active.
e. I try to have a healthy diet but I don't always manage it.
f. I usually avoid some harmful foods and prefer some healthy ones.
g. My diet is always governed by rules of health.

Statement (e) was the most often selected statement, showing a not always successful attempt from the students to eat healthily. The least often selected statement was (a) which reveals no commitment to a healthy diet. Not all those nine students, however, showed a complete lack of commitment to eating healthily as most of them chose other statements as well. In fact, just five students chose none of the statements (e), (f) & (g), which show an outright commitment to healthy diet. Three of them were British and three female. The percentage of male students that selected statement number (b) (priority of hunger) was two and a half times as high as that of the female students (Pearson $x^2 = 4.945$, $p = 0.026$).

STATEMENTS ABOUT DIET PROFILE	GREEK N=20 No	%	BRITISH N=20 No	%	MALE N=19 No	%	FEMALE N=21 No	%	TOTAL N=40 No	%
a. I eat whatever and whenever I want	6	30	3	15	5	26	4	19	9	23
b. I just eat when I feel hungry	9	45	5	25	10	53	4	19	14	35
c. It's very important for me to enjoy what I eat	8	40	7	35	7	37	8	38	15	38
d. I just eat and keep active	4	20	7	35	7	37	4	19	11	28
e. I try to have a healthy diet but I don't always manage it	14	70	11	55	11	58	14	67	25	63
f. I usually avoid some harmful foods and prefer some healthy ones	8	40	6	30	8	42	6	29	14	35
g. My diet is always governed by rules of health	6	30	8	40	7	37	7	33	14	35

TABLE 46: Numbers of students that selected each statement as descriptive of their eating habits

7.4 Measures of performance and associations

Three variables were developed in order to portray the General Health Motivation of the students. The first variable, which was named '*comprehensiveness of hobbies*', represented the number of kinds of hobbies that each student was involved in. For instance, if a student's hobbies were skating, body-building and swimming, s/he was marked with 1, since all his/her hobbies were of one kind: energetic. For another student, who said that s/he reads literature and socializes, the value for this variable was 2, since s/he was involved in two different kinds of hobbies.

The variable for assessing the preventive behaviour of the students was named '*depth of precautions*'. The values of this variable represented the number of precautions that each student was involved in. For instance, if a student said that s/he abstains from smoking and visits the dentist regularly, s/he was marked with 2.

In order to rate the students' perceived commitment to healthy eating, a new variable was created, the '*diet profile variable*'. This was created as follows: each of the statements of the relevant questions was equated to a number of points from 1 to 5 with more points denoting higher commitment to healthy eating:

Statements (a) and (c): 0 point (no commitment)

Statement (b): 1 point (least degree of commitment)

Statement (d): 2 points (medium commitment)

Statements (e) and (f): 3 points (high commitment)

Statement (g): 4 points (maximum degree of commitment).

Students that selected just one statement were given the corresponding points of this statement. Students that selected two or more statements were given the points of the statement with the higher rank if the statements were compatible. For instance if a student chose statements (g) and (c), s/he was given 4 points, as healthy eating and enjoyment from eating are not contradictory. If, however, another student chose statements (g) and (e), s/he was allotted the average of the corresponding points, i.e. 3.5, because *eating always* healthily and *not managing to eat always healthily* are to a certain degree contradictory statements.

The mean value of the whole sample was 2.61. The means for the different groups in the sample are summarized in table 47. The most often occurring value (the mode) was 3.

VARIABLE	MEAN SCORES AND SIGNIFICANCE						
	G	B	Mann-Whit. U, p	M	F	Mann-Whit. U, p	Overall mean
Comprehensive-ness of hobbies	1.85	2.25	162, 0.278	2.11	2.00	173, 0.440	2.05
Depth of precautions	1.15	1.00	188, 0.731	1.26	0.90	156, 0.212	1.08
Diet profile variable	2.50	2.73	172, 0.428	2.63	2.60	184, 0.660	2.61

TABLE 47: Mean values of variables describing the levels of hobbies, precautions and the diet profile of the students. G = Greek, B = British, M = male, F = female.

The perceived commitment to a healthy diet was also correlated to the beliefs that the students maintain about healthy eating. Those beliefs were categorized as general beliefs, e.g. "diet must be proportional" (Section 5.2.1), and as specific beliefs, e.g. "fibre intakes contribute to the health of the bowel" (Section 5.2.2). There was found a non-significant negative correlation between the number of beliefs maintained and the degree of commitment to a healthy diet declared by each person (the diet profile variable) (Spearman's rho = -0.124, significance 0.445). Between the number of precise specific beliefs (Section 5.2.2) and the degree of commitment to a healthy diet there was found a statistically significant positive correlation. Spearman's rho equals 0.319 with significance 0.045.

Some comparisons of the mean values of the diet profile variable for the different groups of the sample were performed. The results of these comparisons appear in table 48.

GROUPS OF THE SAMPLE AND MEAN 'DIET PROFILE VARIABLE'. A higher value of the variable denotes a higher commitment.		MANN-WHITNEY U	SIGNIFICANCE
Greek students (N=20): *2.5000*	British students (N=20): *2.7250*	172	0.428
Male students (N=19): *2.6316*	Female students (N=21): *2.5952*	184	0.660
Recognizing CVD as a target of healthy diet (N=23): *2.8478*	Not recognizing CVD as a target of healthy diet (N=17): *2.2941*	125.5	0.045*
Professing taking some kind of protection against diseases (N=24): *2.4792*	Professing not taking some kind of protection against diseases (N=16): *2.8125*	151	0.236
Professing that it is important for them to enjoy what they eat (N=15): *2.2000*	Not professing that it is important for them to enjoy what they eat (N=25): *2.8600*	133.5	0.114
Greek students professing that it is important for them to enjoy what they eat (N=8): *1.6875*	Greek students not professing that it is important for them to enjoy what they eat (N=12): *3.0417*	17	0.012*
British students professing that it is important for them to enjoy what they eat (N=7): *2.7857*	British students not professing that it is important for them to enjoy what they eat (N=13): *2.6923*	43	0.835
Mean value for the whole sample: 2.6125. The diet profile variable ranged between 0 and 4.			

TABLE 48: Professed commitment to healthy diet of the whole sample and of the different subgroups. (*) denotes statistical significance < 0.05.

7.5 Discussion

7.5.1 Health-related activities

All of the students' hobbies could in one way or another be held to be conducive to health. Exercising and outdoor activities help bodily health and may increase environmental consciousness; reading and cinema going may promote mental health; socializing is a kind of promotion of social health and all the above are conducive to psychological well-being. Moreover, 70% of the students said that they practice hobbies from at least two different categories, e.g., reading and playing football, which shows a broad promotion of health. One might question, though, how healthy it is to dedicate all your free time either to reading or to exercising. There were 11 students who were unilateral in their selection of hobbies, reporting either intellectual or exercising activities. Among those students there were five strenuously exercising students. For Downie *et al.* (see Section 1.2.1), concentration on one aspect of human nature is to the detriment of the others. It is encouraging, though, that the percentage of the students who reported having a wide range of healthy interests is high.

7.5.2 The meaning of precaution and why it is taken

From the answers presented in Section 7.2.2 it appears that for the great majority of the students precautions against diseases are very distinctive actions which when taken (or not taken) have a more or less immediate result. For instance, if one exposes oneself to low temperature one will catch cold; if one does not visit the doctor when one is sick, one's situation will deteriorate, or if one has unprotected sex one risks catching or transmitting STD. None of the habits that have long term benefits for protection against diseases were reported in this question, except in one case. This finding suggests that students are highly unlikely to consider habits with long term effects on health as precautions. For instance, none of the students who reported abstinence from smoking reported that protected her/himself against cancer or hypertension and only one student who reported eating carefully said that she thus protected herself against heart disease. This cannot be attributed to the fact that those students did not know the protective effect that diet may have on the above-mentioned diseases. In Section 5.2.2 (see also crosstabulations 12-15) it was mentioned that for 23 students the target of healthy eating is a healthy circulatory system. Moreover, those 23 students appear to have a significantly higher commitment to healthy diet than the rest of the students (table 48).

This shortsighted perception about precautions cannot be explained by one sole hypothesis, valid for everyone. A number of hypotheses may apply to different extents for different subjects. Here are two possible hypotheses:

1. Young people are preoccupied with good-health rather than ill-health. With this logic, abstinence from smoking is a decision made mainly for aesthetic reasons (looking nice) and care for good diet is taken for improving their body image or boosting their athletic performance, and not for avoiding ill-health.
2. Habits like a good diet have an overall beneficiary effect on health which cannot be specified, and having a good diet is not a decision made with specific diseases or conditions in mind. This attitude was in fact stated explicitly in one case:

   > "I don't think there is one specific thing about eating healthy; I think that it generally improves your health all round. So I noticed the difference in my aunt when she went on diet, when she was eating more healthy, I don't know, before she was eating fatty foods, but when she was eating carbohydrates rather than fatty foods she would have more energy ..." (B.37, Q.26)

In Chapter 2 it was discussed that a common feature of all the social-psychological theories that try to explain human behaviour regarding health-related activities is the recognition that at some time there has to be made a decision about the adoption of such an activity. This decision, according to the same theories, is made on the basis of the merits of the typical behaviour and the effect that this behaviour is expected to have on the individuals. The afore-mentioned findings however, if generalized, suggest that the majority of sixteen-eighteen year old students do not make decisions about diet grounded on the knowledge that this diet may prevent a specific illness in the long term. On the other hand, the figures in crosstabulation 43 constitute a slight indication that the recognition that illnesses in general are caused by habits is a predictor of the avoidance of abuses.

The only student who reported eating healthily as a precaution against disease (see case G.11 in Section 7.2.2) admitted to have been motivated by her feelings of vulnerability, caused by her father's death. However, it is highly unlikely that this was the only person of the sample who felt vulnerable to a disease that is caused or promoted by renowned habits. Another student reported having heart problems in the past (B.23) and many students referred to the toll of lives claimed by cancer. None of them, though, reported any of their preventive habits as a precaution; indeed some of them did not report having acquired any such habit.

If these findings are generalized they suggest that knowledge about the high incidence or lethality of some diseases on its own does not function as a cue to action for students at this age. For an event or fact to function as a cue to action it has to have a dramatic effect on the individual like the death of a close relative or friend. A student at this age is likely to accept a healthy habit as part of a **platform of a healthy lifestyle** rather than because of the reported long-term protective effect against a specific illness of this habit.

7.5.3 Food preferences

There exists a connection between the numbers of students who mentioned the different food groups when recommending a healthy diet (Chapter 6) and when describing their own diet (present Chapter). Data in tables 31, 44 and 45 show that most students speak about starchy and protein foods, fewer students about fruits and vegetables and the least about fatty and sugary and dairy foods. These findings are congruent with the way that the same students compared their diet to the 'HEA plate' (appendix no 3) and with the frequency with which they mentioned the nutrients as constituents of the different foods (Section 5.3, tables 22 & 23). Taken together all these findings suggest that regarding the preferences and eating practices of the students:

- Vegetables and fruits are perhaps the least attractive food group of the 'HEA plate' [1].

[1]Another study has found that Scottish people eat relatively low quantities of vegetables and, especially, fruits, but it refers to adults only (Anderson *et al.*, 1994). If younger people feed similarly, this would be an explanation for the parsimony with which students of the present study spoke about the green sector and especially fruits.

- Starchy foods are the most likable food group and the few students that refrain from this food group do so because they believe that it contains fattening foods.
- Protein foods provoke mixed feelings among students. There are students who eat a lot of them, motivated from their belief that protein must be consumed in large quantities and some others (especially girls) who do not like and avoid either meat or legumes.
- Dairy foods also provoke mixed feelings among students, and are mentioned (either as liked or as avoided) by quite a few of them.
- Although sweets and fatty snacks are savoured and eaten in excess by a number of students, students are rather reluctant to refer to them while commenting on their eating preferences.

The **terminology** that the students use in describing their eating preferences and practices can be revealing about their perception of food. As noticed in Sections 7.3.1 and 7.3.2, students are very specific when they name the starchy foods that they eat, less so when they speak about protein foods and say very little about the fruits and vegetables that they do or do not eat. If we combine these findings with the ones mentioned earlier, i.e. that starchy foods are never named as disliked or avoided ones whereas some protein foods and fruits and vegetables appear to be the least liked and least eaten foods, it seems that there is a kind of positive correlation between the specificity with which students refer to foods in certain food groups and the extent to which they like to consume foods from these same groups.

This possible correlation may be attributed to a number of reasons. Some students may not want to elaborate about unpleasant or distasteful things. In that case the verbal parsimony is the result of disenchantment. A second reason may be that people say little about things that they are not familiar with. To be familiar with a food means to have tasted it, and perhaps to know its composition and physiological properties. So it is possible that some adolescents having not experienced a wide range of the foods included in each group have not yet discovered those foods that they would enjoy eating.

This last contingency obviously constitutes a barrier against variety in food choice. How possible is it for somebody to start eating a food that s/he actually ignores? This is particularly unhappily to happen if s/he believes that one or two kinds of food from each food group taken in the right quantities "will do the job" (Section 6.5.3.2).

The implications for nutrition education are obvious: it is not enough to stress the importance of each food group for a healthy diet. The variety in each food group has to be substantiated. Pupils and students should be instructed how to discover the different types of foods, to learn about their properties, to taste and cook them. Such an approach means that nutrition education has to be empirical, carried out in the classroom, the food store, the kitchen and the dining hall.

7.5.4 Who is more likely to adopt healthy eating habits?

7.5.4.1 Students take care of their diet

Seventy per cent of the students of this sample reported that they take care of their diet. Thirty per cent of the same sample reported that they have a firm commitment to healthy eating. These statistics suggest that the majority of students are persuaded about the need to adopt healthy dietary habits. Boys and girls, British and Greek students, those that report taking precautions against diseases and those that do not, they all show more or less the same degree of commitment (see table 48). The small variance of the reported commitment to healthy diet is partially explained by two other variables, one affective (pleasure from food) and one cognitive (specific knowledge about physiology of food).

The fact that young people are nowadays trying to eat healthily is also reported in a longitudinal study conducted in Britain (Cox *et al.*, 1993). Over half the youngest respondents in that study reported changing their diet mainly as a result of health campaigns. The results of the 'HEA' (1992) survey about young people's concern with diet also reflect the fact that young people are today concerned with their diet. 31% said that healthy diet is important to them, 39% said that they put equal emphasis on health and the enjoyment of food and only 29% of them said that they do not care about their diet's healthiness.

In the study by Cox *et al.* it was found that the proportion of people who eat breakfast, and especially consume cereals, is increasing. In the present study, this trend is confirmed as 85% of the British students reported having breakfast daily and

60% of the same group said that usually have breakfast cereals. In another study dealing with 11-13 year-old Scottish pupils (Seaman *et al.*, 1997) 74% of the respondents stated that breakfast is important for them.

7.5.4.2 Food enjoyment and commitment to healthy diet

The students who say that enjoyment is an important factor for choosing their food appear to be slightly less committed to healthy diet than the rest. This appears to be a statistically significant difference among the Greek students (see table 48). To what should this correlation be attributed? Is it because one cannot have many priorities that determine one's behaviours or is it because some students believe that healthy food is monotonous and boring? In fact, the last attitude was expressed twice by two English students:

> "I suppose you cannot go too healthy with food, it will taste a bit plain, you know... I mean, I don't really like rabbit food, like lettuce and things. I can eat it but is boring" (Q.12, B.36).

and:

> "I usually have things like pasta, chips etc, things that are healthy but at the same time are not so healthy, so they taste nice, so you get enjoying of both. So, I will never get anything as healthy that doesn't taste nice. It has to taste nice for me to eat it" (Q.10, B.25).

The second student seems to say that there is a dichotomy between healthy and unhealthy foods and that unhealthy foods taste better than healthy. Probably, he considers pasta healthy food and chips unhealthy; so he includes chips in his diet so that it becomes more enjoyable. The labelling of foods that are produced and processed according to the rules of hygiene and public safety as unhealthy is misleading. There is nothing bad with, say, chips, if consumed moderately. Their high fat content can be counterbalanced by the consumption of foods low in fat and high in other nutrients. This student appears to have solved the ostensible clash between healthiness and palatability by applying proportionality to his diet. But he believes that he is not quite correct, because he consumes some 'unhealthy stuff'. The other cited student appears to have made his way through in the same way:

"...you cannot go too healthy with food"

i.e., he probably considers his diet healthy to some extent only.

For those two students the controversial labelling of appetizing foods as unhealthy has not deterred them from feeding healthily. Other students, though, who share the same attitude, may have been deterred. In fact, a closer examination of the figures in table 48 shows that this sense of incompatibility between a healthy diet and enjoyment from eating mainly characterizes the Greek students. So, the Greek students that have enjoyment from food as a priority have a significantly lower mean 'diet profile variable'. The same does not happen with the British students who appear more skilled at making the ends meet. This skill is epitomized in the phrase "balanced diet". This notion was mentioned 21 times by 9 British students but by none of the Greek students. A British student described the concept of balanced diet in the following terms:

> "I think you need more of them, more carbohydrates from the potatoes, and fruit and veg. give you vitamin C and things like that, that's why you need larger amounts (...) Whereas when you get a lot of fatty foods... you need more of fruit and veg., and bread and cereals, potatoes, than you would of these, these bottom ones fatty foods, the meat and fish, milk, dairy foods..." (B.36, Q.22)

According to this view balancing means to keep the intakes of the different food groups within the right proportions. In that case the over-indulgence in (say) fatty foods can be balanced out by increased intakes of fruits and vegetables.

This concept of balanced diet being so popular among British students and almost unknown among Greek students, in conjunction with the fact that Greek students who stressed the joy from eating professed a lower commitment to healthy diet than the rest of their compatriots suggests that there exists a different policy of information about healthy eating among those two underlying populations. The British policy propounds the message that it is quite legitimate and healthy for somebody to eat pleasant food, provided that s/he eats from the different food groups with a sense of proportionality. The Greek policy is: "keep away from forbidden foods". Both of these appear to be implicit policies as they are not expressed in any formal document (see Section 1.6).

The British policy, by saying to students that they do not necessarily have to abandon delight from food in order to feed healthily, appears consistent with two of the theories discussed in Chapter 2. According to DOIT (Section 2.2.2) it is easier to make somebody to adopt an innovation (in this case to feed healthily) whenever this innovation appears compatible with that person's existing personal values and experiences (in this case food preferences). Similarly, HBM (Section 2.2.3) propounds that reducing the perceived burdens of a preventing action probably makes the balance 'benefits minus costs' positive and consequently this action is easier to adopt.

The consequences for nutrition education are obvious. We should stop speaking about unhealthy foods (or even worse about prohibited foods) and we should emphasize the meaning of balanced diets instead, i.e. those diets which contain a great variety of foods in the right amounts and proportions. This strategy might help some students, who are now deterred from adopting healthy dietary habits because they identify a healthy diet with an ascetic diet, to revise their attitude.

7.5.4.3 Beliefs about healthy diet and commitment to it

Those students who recognized CVD as a target of specific dietary habits appear to be slightly more committed to a healthy diet than those that did not. The relatively low statistical significance may be due to the small sample in this study. Further research might test the hypothesis that knowledge of specific targets of diet can function as a motivation for adopting healthy dietary habits in general. This is not identical with saying that the students who recognize CVD as a target of specific dietary habits are more likely to adopt those habits as a precaution against CVD (see Section 7.5.2). This knowledge may function, even subconsciously, as one of the factors that make people concerned about diet.

Specific beliefs about healthy diet, i.e. knowing both the action and its target, appear to be predictors of (professed) commitment to healthy eating (see end of Section 7.4). On the other hand, general beliefs about the characteristics of a healthy diet do not appear to be such a predictor. One may question what the students mean by healthy diet and whether their perception about it coincides with the nutritionists' recommendations. However, the fact that their professed commitment was positively correlated to their correct beliefs constitutes an indication that these students try to practice healthy eating habits.

The theory of reasoned action posits that attitudes and behaviour are expected to relate strongly whenever they coincide in action and target (Section 2.2.4). The width of this research is not adequate to substantiate this hypothesis, however its findings are in harmony with it.

Summarizing the effect that students' precise knowledge of physiology of food may have on their adoption of healthy eating habits, we can conclude that it looks as though this knowledge acts as a stimulus for them to accept the whole platform of healthy diet, not necessarily for preventing certain illnesses.

Finally, in this speculation about the reasons that make students concerned about their diet, the role of ethnic cuisine should not be overlooked. Some British students of Eastern origin attributed their presumed healthy eating habits to their dedication to tradition (Section 7.3.1). In the present era of globalisation, traditional lifestyles are considered by many as pledges of mental and physical health and as defences against the alienation of modern man. So, the ideology of ethnicity may function as a factor facilitating the adoption of ethnic cuisines, which are usually considered as balanced (for the Mediterranean cuisine see Section 1.4.2). This is one more instance of people adopting healthy habits for reasons that are not narrowly associated with bodily health.

7.6 Conclusion

At this point some answers will be given to the questions posed in the introduction of this Chapter.

1. The students of the present study appear to have a wide range of hobbies, which is conducive to the overall health. British students appear more interested in physical activities, Greek students with intellectual ones. However, not many students seem to bother about precautions, or they do not appear to use this term for habits that can prevent illnesses in the long term. These findings are in harmony with the students' perception of health: most of them understand health primarily as well being, and few mention negative aspects of health (Chapter 4).
2. The students of this study appeared alert to the need to have a balanced diet and most of them reported that they try to feed well. When students

spoke about their diet, they mentioned mainly starchy and protein foods, then vegetables and fruits, and least of all dairy and fatty and sugary foods. Especially from the first two food groups they mentioned more specific foods than from the rest of the food groups. The same trends in the naming of the different foods were observed when the students expressed their beliefs regarding the physiology of food (Chapter 5).

3. The professed commitment to a healthy diet was negatively correlated with the pursuit of enjoyment from food among Greek students only. It was hypothesized that in Greece, and especially in the Greek school, some likeable foods may be labelled as banned, while the British practice may promote the meaning of balanced diet instead. Over the 40 students, the commitment to a healthy diet was also positively correlated with the belief that a certain diet can protect against CVD. As the same students did not confess that they take precautions against any disease, it was hypothesized that some renowned physiological effects of food may have acted as persuaders about the need to have a balanced diet, but ultimately young people opt to have such a diet, for the sake of a wider range of objectives, which have to do with good-health rather than ill-health.

In the light of these findings the following suggestions for nutrition education are made:

- Nutrition education has to have a wide scope and to instruct the students on the benefits of balanced diet on both good- and ill-health.
- Students must be helped in order to develop the skill to scrutinize their diet.
- The classification of foods as healthy or unhealthy should be substituted by the strategy of promoting proportionality in diet.

As for further research, the following questions are suggested:

- To what extent is pleasure from food negatively correlated with commitment to a healthy diet?
- Does deep knowledge of specific physiological outcomes of diet act as a persuader for the adoption of a balanced diet?

EPILOGUE

This study was not designed to prove any hypothesis. However, some suspicions expressed in Chapter 1 about the inadequate presentation of health and its factors in British and Greek schools have been reinforced.

More particularly, in Section 1.2.2 it was suggested that health depends on three factors: heredity, environment and lifestyle. In Section 1.6.3 the comprehensiveness of the concept of health and of the effects of healthy diet on total health as portrayed in the official documents that guide health education in Greek and British schools were questioned. It was argued there that health per se is not suggested as an issue for consideration, that the effects of a healthy diet on physical health are not stressed adequately and that the psycho-mental and environmental aspects of diet are not brought up.

These characteristics of formal education were partly reflected in the ideas expressed by the students of the present study. So, the typical British or Greek student, as emerges from this study, tends to emphasise bodily good health and disregard heredity and the social and physical environment as aspects of health (Chapter 4). S/he almost always attributes human pathology to habits (most often the failure to adopt good habits rather than to the adoption of bad habits) and gives the impression that the management of his/her health, no matter how radical, depends on his/her actions, or, to use more technical terms, s/he possesses principally an Internal Health Locus of Control. Moreover, s/he locates the results of a balanced diet mainly in growth and weight control when expressing his/her ideas about diet freely without the use of any kind of cue (Chapter 5).

Far from being the vindication of a hypothesis, this way of thinking cannot be irrelevant to formal instruction on health and nutrition. A student that has received adequate instruction on the social dimension of health, i.e. how people's health depends on their economic and social status, is unlikely to describe healthy diet only as an issue of personal choices. Similarly, it is unlikely that the same student will aspire only to bodily gains from a balanced diet if through her/his school career s/he has been involved in a lasting and wide-ranging discourse about the nature of health.

It follows then that the widening of students' perceptions about health, health factors and healthy lifestyle should be stirred up through comprehensive health education in school. Some parameters of such an education were outlined in Chapter 2. Apart from the informational parameter, a coordinated school health policy is necessary. Social skills may promote students' empowerment. Interventions about exercise, diet etc may facilitate the passing from 'reasoned considerations' to 'habitual shortcuts' (Section 2.3.2.3). Finally, the opening of schools to families and the community may train students in solving health-related problems in real life situations, not just in the classroom's virtual reality.

It has to be admitted that in a health education policy that deploys so wide a range of strategies there lurks the danger of diluting the educational objectives. Social empowerment of the students, for instance, can sometimes be taken as nurturing addicted activists. The opening of the school to family and society may downgrade the didactic role of the school, as different cases of persons or practices which are introduced for study might be wrongly perceived as appropriate models. Such problems can be evaded only by establishing the objectives of each strategy, lesson or intervention, by communicating them to the participants and by sticking to them. After all, the quality of the teaching processes is not only safeguarded by introducing a wide range of teaching strategies.

The eating habits of the students were studied here in connection with their understandings of health and healthy diet. A clear conclusion of Chapter 7 was that "a student at this age is likely to accept a healthy habit as part of a platform of a healthy lifestyle rather than because of the reported long-term protective effect against a specific illness" (Section 7.5.2). Findings of other studies also suggest that adult people adopt such habits as a part of a healthy living context. So it was found that people aged from 20 to 65 years of age ate diets with a lower fat content and a higher nutrient density than inactive subjects (Mathews *et al.* 1997) and a meta-analysis of nutritional surveys showed that smokers said they had significantly higher intakes of energy, total fat, saturated fat, cholesterol and alcohol and lower intakes of polyunsaturated fat, fibre, vitamin C, vitamin E and β-carotene than non-smokers (Dallongeville *et al.* 1998).

Another finding of Chapter 7 was that the students were generally concerned about health and specifically concerned about diet. Concern about health, however, is not the same as achieving good health. To be concerned shows intentions, attitudes or even attempts. Achievement means having converted this concern into everyday practice. Only a few students reported habits like systematic mental or bodily exercise and a persistent healthy diet, which reveal general health activation. The rest, i.e. the majority, appear to be in the state of health concern.

These two findings, i.e. that students fathom a healthy diet within the context of healthy lifestyle and that they are health concerned, is an achievement and a challenge for school health education. Health concern is a state for which health education has toiled and health concerned subjects are potentially receptive to instruction about how to transform concern into proper habits. But this instruction ought to be sound, comprehensive and convincing. Education is sound and comprehensive when it promotes total health (Chapter 1). It is convincing when it corresponds to the personal values and priorities of the people concerned (Chapter 2). The values and priorities of the subjects of the present study appear to be good taste, good looks and fitness, rather than the avoidance of ill-health (Chapters 5 and 7). These priorities and values, which are also pinpointed in other studies (Glanz *et al.* 1998), ought to be seriously considered by nutrition education. It is not suggested here that these are the only values and priorities that should be considered. After all in this study deviations from the rule were met almost as frequently as the rule was followed. So, health education, and nutrition education in particular, should be even-handed to the majority as well as to the minority and should vary its messages and strategies in order to correspond to students' needs (Chapter 2).

In the previous chapters several suggestions were made concerning nutrition education that were based on this study's findings. All these findings can be epitomized in one word: balance. Instruction about balanced diet should be balanced itself from several points of view:

- Positive and negative eating recommendations are of equal importance. A balance between 'eat' and 'eat moderately' messages is necessary so that nutrition education does not foster negative feelings about foods yet at the same time projects the need for self-control. As a strategy, balance between positive and negative recommendations are also applicable for all food groups, thus helping students to plan more comprehensive diets (Chapter 6) and enabling them to scrutinize systematically their eating habits (Chapter 7).

- Nutrition dialectic should strike a balance between assertiveness and composure. The emphasis on each recommendation should not be so intense as to categorize foods as unhealthy and healthy ones or to imply that some nutrients are poisons and some other ones panaceas. Some students appear to have developed such views (Chapters 5 and 6). Practical consequences of these views are that certain foods are over-consumed on the ground that they contain 'precious nutrients' or that healthy eating habits are avoided on the ground that a balanced diet bans many palatable foods and thus is monotonous and boring (Chapter 7).
- School nutrition education should make use of foods and speak the language of nutrients in balance. Making use of foods ensures the linking of school class experience with everyday life. Speaking of nutrients facilitates knowledge (Chapters 5, 6 and 7), rationalizes one's beliefs and reduces the likelihood of manipulating peoples' habits.
- The generalization of the findings of this study leads us to believe that students of this age view health as a matter that should concern mainly the individual, that health is determined mainly by his/her lifestyle and that healthy eating in particular depends on personal activation (Chapters 4 and 5). New trends in health and nutrition education, however, stress the need for an ecological, communal and social consciousness of students that implies a collective activation in matters of health (Chapter 2). In fact, these two models of activation should not be mutually exclusive but rather work in balance. Activation of the individual is needed for making positive everyday choices and as a pledge of avoidance of depersonalization while collective activation is needed for undertaking those changes in legislation, production, the market, and public services that safeguard the knowledge for and the possibility of making the above choices. As for health education, the challenge is to enable students to make decisions as individuals while acting also as members of a society.

THE CHOICE OF METHODOLOGY

In terms of methodological approach the present study would at first sight be categorized as a small-scale survey. Apart from the qualitative analysis, the collected data were also analysed quantitatively, especially those data that derived from closed questions. Also, some general conclusions were drawn based on the statistical results. These are all characteristics of a survey.

Additionally, this study bore the characteristics of assessments and case studies. The inclusion of exercises that were designed to rate students' functional literacy on healthy diet points to assessment. The way that each student's responses were collated in order to interpret individual thinking, i.e. to reveal each student's rationale, points to case studies. Finally, an interview is not a very popular instrument of research in surveys, because in surveys the interaction between researcher and respondent is meant to be kept minimal. So, categorizing this study as a certain model of research is not easy.

The decision for so mixed a model of research was dictated by the intricacy of the examined subject and was to a certain degree justified by the richness of the findings. Its intricacy is due to the fact that understanding about diet is determined by cognitive, affective and behavioural factors. So, each person's understanding differs in qualitative and quantitative terms. The portrayal of this understanding calls for a model of research versatile enough to deal with each individual.

Having completed this study the author wonders whether another model of research might have proven more versatile and fruitful. For instance, the students' eating habits in connection with their ability to use their nutritional knowledge in order to make dietary choices might be more intensively investigated if 'in situ' conditions were devised. This would be an ethnographic approach. Students could have been observed in certain places and times where and when they usually make dietary choices. In this context they could be asked about the factors that determined their choices. Such an approach would have the advantage over the method used here in that it would be more likely to bring about more valid answers. However, this method would be expected to generate data not necessarily relevant to students' understandings of healthy diet as an understanding of a healthy diet might not be a factor determining each student's eating habits. In a few words, such a method would provide a valid and extended corpus of data, suitable for describing and explaining the dietary choices of many subjects, but it would not necessarily provide information about how these subjects understand a healthy diet.

A case study would have been a more suitable method for portraying the understanding that a person or a group has developed on healthy diet and whether this understanding has an impact on his/her dietary choices. Findings from such a research approach would not be suitable, though, for generalizations, even if a group was selected as the case study. This is because the members of a group, be it a class, a family or a group of students, share many factors that determine their eating patterns and their understanding of nutrition. In a school class such factors may be the canteen and the health policy of the school, the curricula of relevant subjects etc. These factors change from school to school. The members of one family gather and eat together in the course of the day or in the course of the week and communicate information regarding the quality of food and the standards of healthy eating. So, a pure case study would have not been the proper method for somebody to investigate "how tomorrow's young adults speak and think about nutritional matters" (Section 3.1.1).

It remains to be seen whether action research might produce richer and more reliable findings. Interventions combined with the evaluation of their outcomes are the most common practice in this model of research. In Chapter 2 several projects aiming at the modification of the participants' dietary habits and the deepening of their knowledge about the links between diet and health were reported. The outcomes of such an intervention are usually gathered by seeing how the dietary habits and knowledge of the participants developed during the intervention compare with the development of habits and knowledge of a control group in the same period. Provided that the attention of the researcher was secondary students' understanding of healthy diet it follows that the base-line evaluation would be of prime importance. Additionally, the outcomes of the follow-up evaluation(s) could be utilized, at least to some extent, to illuminate the functionality of the participants' nutritional literacy, i.e. to what extent they are able to use their knowledge in order to process information and make choices concerning their food. However, a follow-up evaluation is primarily concerned with the intervention itself and the effort undertaken for such a research would be disproportionate in regard with the simpler task of describing and explaining the average student's nutritional literacy. When the average student is the focus of a research, action research seems inappropriate for one more reason. As every intervention engages subjects on a voluntary base, the sample of such a research is almost bound to be in favour of the aims of the intervention, which means a positively biased sample, i.e. not a representative sample of the underlying population.

SAMPLING AND SCHEDULE OF INTERVIEW

Even if the selected method was appropriate for the main question of this study, it does not mean that the study was ideally accomplished in terms of sampling and interviewing. Sampling is a notoriously difficult procedure, especially when the sample elements (in this case students) are grouped in units (in this case schools). Due to this grouping, contamination, i.e. the situation in which some of the questions of the interviews became known to the later participants in each school, cannot be ruled out however small the number of elements in each unit. Additionally, sometimes the head-teacher of a school where the research takes place may perceive that the evaluation of the school is at least part of the aim of the research. So, s/he tries to intervene in order to provide a non-representative sample. Indeed, there were indications of contamination and selective sampling in the course of this study (Sections 3.3.1.1 and 3.3.2.1).

The other difficulty with sampling is whether and how to stratify the sample according to abilities, interests etc. For making sound generalizations it is usually recommended that each sub-group of the population is proportionally represented in the sample of the study. For instance, the sample could be stratified according to the abilities of the students. One could ask whether to stratify according to abilities was more meaningful than to stratify according to interests, to family income, to family status, to professional orientation and so on. In fact, all these parameters may play a role in dietary preferences and nutritional literacy. It is admitted that so sophisticated a stratification was well above the ability of the researcher given the circumstances of selection of the participants (Sections 3.3.1.1 & 3.3.2.1).

It has also to be admitted that the British sample was not very homogenous in terms of the type of school attended and in terms of the stage of education. So, of the four units of sample, three were colleges that prepared students for tertiary education, whereas, the fourth was a college that oriented students towards professional careers. Furthermore, of the fifteen students who attended the first year of sixth-form, ten were interviewed at the start of the school year and five at the close of the school year. So the possibility that the students interviewed later had received better instruction on matters of diet and nutrition, although not very high, cannot be ruled out.

If the study were repeated today, the schedule of the fifth series would be used for both the British and the Greek sample. From the data collected it enabled the writer to have a better insight in two areas: students' understanding of nutrients and their eating habits. So the data collected from the two countries are not absolutely comparable (Sections 6.2.2 and 7.3.2). This factor diminishes the validity of the comparisons made between the Greek and the British sample. The decision to partly change the schedule of the interview after the interviews in Greece had been completed was taken with the awareness of this disadvantage. This was considered a price worth paying for obtaining a deeper and clearer insight of at least some students' understandings.

ABOUT VALIDITY AND RELIABILITY

It is generally accepted that the best way of obtaining valid answers in interviews requires the avoidance of bias on the part of the interviewer. Bias in the present study could be induced if in the course of the interviews certain attitudes of students were taken for granted. For instance, if there were questions that assumed that health is a valuable asset for everybody or ones that assumed that all students value a balanced diet. Such assumptions were avoided and the wording of the questions dealing with attitudes or habits did not always lead to 'desired answers', see, for instance, Qs 3, 5, 9, 14a in the schedule of the fifth series of interviews (Section A.2.5). Besides, diet, as a determinant of health, was only raised in the interviews after the students had spoken about what they deemed as healthy habits specifically in order to find out whether they mentioned diet spontaneously. Additionally, in the closed questions, the possible answers covered a wide range of stances. For instance, when the students were asked to give a general image of their diet, they were provided with a palette of answers that ranged between absolute indifference and a constant commitment to a healthy diet and when they were asked about the outcomes of a healthy diet the possible answers varied between positive and negative outcomes in the near and the distant future.

Having said that, it is recognized that it is impossible to investigate somebody's views about a balanced diet without ever mentioning in the discussion words like 'health', 'illness', 'nutrients' and 'foods'. In other words, focusing the subject of a discussion is necessary if we are interested in getting reliable answers, even if this is made at the expense of a degree of validity. If, for instance, students' ideas about a healthy diet were gleaned by questions that did not specify this term, the purposes of the study would not be satisfied.

It is generally agreed that one cannot insist on reliability being the overriding consideration if we want to get valid answers in interviews and that reliability is safeguarded by having highly structured schedules of interviews. But if this tactic of structuring interview schedules very precisely was followed in the extreme, human interaction between interviewee and researcher would be ruled out and the interviewee would not be encouraged to speak expansively. Besides, probes, one of the most valuable tactics in interviews, are not mechanical reactions. A response is expected to trigger different probes from different interviewers. So, the chase for total reliability in data collection through interviews looks impossible.

Some questions may be posed about the different degree of reliability in the answers given by Greek and English students. The researcher who carried out the interviews is a native Greek speaker, and he uses English as a second language. This may have resulted in a different balance of power between interviewees and interviewer in Greece and England. At least some British students, being more fluent speakers than the interviewer, may have felt more self-confident and consequently freer to disclose their attitudes and habits compared to Greek students who had not the advantage of eloquence over the interviewer.

DATA ANALYSIS

So much for data collection. As for data analysis, first of all it has to be admitted that the interviews taken in Greece had to undergo one more degree of "processing" compared to the interviews taken in England: that of translation. In some cases this translation may have slightly impacted the reliability of the data gathered in Greece. Linguistic differences may also be the base of some attitudinal differences found out between the Greek and British sample, a hypothesis already mentioned in the presentation of the data (e.g. Sections 4.2.2 and 5.5.2).

Some more must be said about the reliability of the grouping of responses into categories. Most of the responses to open-ended questions were factual. For instance, the responses of the students regarding their own perceptions as to which are healthy habits were put in categories made ad hoc from the list of their responses. Similarly, responses to attitudinal questions like those that asked values (e.g. "How important is it for you to keep healthy?") or habits (e.g. "What do you usually take for breakfast?") were easily grouped in a number of explicit categories. So, the reliability at this stage of analysis is not a matter of concern. This, though, was only the first reading of the data.

Interpreting data and making sense of them means to build more general categories and this process was followed repeatedly in this study. Reliability at this stage of analysis may be questioned in two respects: the creation of the general categories and the allocation of the responses to these categories. In fact, these two actions were not quite distinct in the process of analysis. Sometimes the building of categories was made according to concepts that were put forward in the theoretical part of the study and sometimes the students' responses gave birth to new categories. In other words, sometimes theory guided analysis and sometimes analysis directed theory. An example to illustrate the building of categories is the grouping of targets of healthy diet. In this case the frame was initially set in advance. Health was defined in Chapter 1 as either positive or negative. So, students' targets were grouped in these two categories. However, some of the targets set forth by the students did not fall easily to these two categories, as they referred to bodily function. So, a third category was created. Obviously, not all the students had the same perspective with the writer when speaking about health. And although the introduction of a third category clouded the image of the theoretical framework, the new perspective could not be ignored.

In other cases the emergence of general categories was induced by the large variety of statements without the need to refer to a theoretical concept. This happened with students' beliefs as to what constitutes a healthy diet. The writer managed to define three general groups of actions: selectivity, food and processing quality, and self-restraint. Another researcher might from the same data deduce another set of categories. This ambiguity should not be seen as a defect. In humanities, as well as in pure science, inferences are never unanimous. It is important, though, for the researcher to present the data on which s/he grounds these inferences as well as the process of collecting them. Consequently, in writing up this thesis the effort was made to present as many as possible of the 'raw data' as well as the way of collecting them before drawing conclusions.

The writer also believes that the reliability of allocation of the students' responses into these general categories was to a great degree safe-guarded thanks to careful supervision by his tutors. Having said that, he recognizes that in a larger scale research project the reliability of allocation of responses to such categories could be ascertained if different researchers made the same allocation independently.

In order to draw valid inferences the writer tried to explain why students have made certain statements in certain cases. So, for getting at the root of a mentality one has to determine to what degree a statement should be taken literally, or metaphorically, or whether the essence of a response is corroborated from other sayings of the same person or not. In other words, apart from the vertical treatment of the data, i.e. looking along the cases, the horizontal treatment, i.e. focusing on each case separately, secures a clearer, deeper and consequently more valid understanding of the participant's rationale. To make this way of analysis clearer, here are some examples. In Section 6.5.1 the (alternative) view that we must eat much protein was attributed to the confusion between 'important nutrient' and 'to be eaten in large quantities nutrient' by consulting the respondents' sayings in different parts of the interview. Similarly, in Section 6.5.3 the view that we must eat much meat was attributed to the expressed beliefs of the students that we must have lots of protein. Of course, such an analysis does not always ends up explaining and illuminating all statements. Sometimes it reveals contradictions or inconsistencies, as in the case of the student who, although having mentioned bulimia and anorexia as diseases linked to diet, failed to stress the need to have reasonable intakes of energy (Section 6.5.1).

Trying to understand what each student said and putting this in the context of her/his general beliefs was one of the perspectives of this study. The other perspective was to make comparisons between sub-samples. Making generalizations demands a minimum of statistical calculations and selecting the right statistical techniques depends on the correct characterization of the data that are to be analyzed. The handling of the students' sayings gave birth to three kinds of data: nominal, ordinal and interval.

Nominal data were the 'demographic' variables like the students' gender and nationality and their non-quantifiable stances on a matter. For instance, whether they identified a certain disease as common or not, and whether they used nutritional argumentation in explaining a table or not. These data are sometimes called dichotomic data. Crosstabulation is the technique of combining two such variables in order to find out whether these variables are independent or not. For instance, it was examined whether it was equally probable for Greeks and British students (variable nationality) to use nutritional argumentation or not (variable type of argumentation). The way to quantify this result is the calculation of chi-square and level of probability. It was found out (Section 6.3.2) that British students were more likely to use nutritional argumentation than were Greek students (Pearson chi-square = 10.157) and the probability for this conclusion to be incorrect was 1 in 1000 ($p = 0.001$). The chi-square technique cannot be used when some of the cells of the relevant crosstabulation have values lower than 5. But this does not mean that no indications can be drawn. For instance, it was examined whether students that mentioned bad habits as causes of diseases and those who did not were equally likely to declare themselves as abuse-avoiders (crosstabulation 43). The figures in the cross-tabulation suggest that the 'null-hypothesis', i.e. that these two classes of students are equally likely to declare themselves as abuse-avoiders, cannot be supported, although a chi-squared value cannot validly be calculated because one of the cells has a very low value: 1. The indication, however, is that students mentioning bad habits as causes of diseases are more likely to declare themselves as avoiders of health abuses than are the rest of the students.

Those data that showed the different strength of an attitude or the different degree of commitment were characterized as ordinal. For instance, the 'diet profile variable', which was coined from statements that the students selected in the relevant question, showed the degree of commitment to a healthy diet (Section 7.4). This variable is a scale which shows whether student x professed more or less commitment to a healthy diet than student y. One cannot interpret the values of this scale as revealing ratios. For instance, one cannot deduce that student x professed twice the commitment that student y did merely because the values on this variable for those two students were 2 and 1 respectively. So, the ordinal data ranked the students in grades of an attitude or a habit. In order to test whether two sub-samples differ with respect to an attitude or a habit which has been measured through an ordinal variable a non-parametric statistic like Mann-Whitney U is considered the most appropriate technique. The t-test is not recommended because this relies on the actual size of each observation, i.e. the numerical values of the variable that is studied, while in ordinal data the values themselves do not indicate anything more than the ranking of the cases. On the other hand, the median-test, which could validly have been used, is not a very sensitive technique.

The numbers of instances from one concept that a student mentioned were characterized as interval data. For instance, how many nutrients a student mentioned in a certain exercise, or how many foods. As with ordinal data, a non-parametric technique was used in order to test the null-hypothesis. This was necessitated by the facts that the sample was small and the distributions of the values did not always fulfill the assumptions of normality. In fact, non-parametric techniques are more powerful than t-test for distributions that do not fulfill the normality assumptions and have relatively small sample sizes (Ian Peers 1996 "Statistical Analysis for Education and Psychology Researchers" Chapter 7).

RECOMMENDATIONS FROM THE THESIS

The findings of this thesis are of two kinds: the answers of the research questions posed in Section 3.1.1 and some novel indications of patterns of thought that emerged from the analysis of the students' responses. The findings of the first kind allow certain recommendations for health education to be made with some confidence because the instrument of the study, the fieldwork and the analysis that followed focused on the specific research questions. The novel indications of patterns of thought, however, ask for further research that would focus on these patterns, would seek their causes and would answer how common they are. Consequently, the final suggestions are made with respect to health education and to further research.

A. For health education:

- Health should not only be a subject to teach but a dynamic discourse in secondary education. This follows from the fact that although students value health they maintain elliptic views about it (Chapters 4, 5 & 6). Consequently, a lasting dialogue must be established among students, teachers, parents, staff, members of the local community and health services in school level. The outcomes should shape the health policy of the school and health education as an issue that infiltrates the curricula of many subjects. Nutrition education should be one of the components of health policy and health education.

- Knowledge about nutrition should not be treated as a matter of information only. A nutritionally literate person, apart from knowing the relevant information, possesses certain skills and these may be cultivated in school. Such skills include: interpreting scientific documents referring to diet, planning a nutritious diet, identifying his/her dietary needs, assessing his/her dietary profile, selecting and preparing healthy food etc. These skills could be developed in science, home economics, chemistry, biology etc.
- Messages about balanced diet should be temperate: no banning of foods, no representation of certain foods as panaceas, no over-emphasis on moderation alone or variety alone, equivalent use of foods- and nutrients-language.

B. For research:

- The concept of the 'health of the ego' which emerged in this study (Chapters 4, 5 & 6) deserves further research. Such research would seek to find out to what extent students of this age understand health as an asset of the individual only and which sectors of their everyday life are affected by this attitude. For reasons that are explained in this study (Sections 2.3.1.4, 3.1.3, A.3.5.3.1) it is important to avoid questionnaires as instruments of such a research.
- Further research may ask to what extent students of this age perceive that (i) The more important a nutrient is, the greater the quantities that we must consume of it; (ii) The more healthy a diet is the less the palatable it is. These kinds of questions could be researched through quantitative instruments as they do not seek to elaborate on new issues but to answer existing well-defined questions.
- This research has not succeeded in finding any statistical correlation between professed healthy dietary habits and adopted attitudes about healthy diet. However, the qualitative analysis has provided certain indications that a healthy diet is adopted in the context of a healthy life-style (Chapter 7). A more focused research approach, which would deploy more rigorous methods of dietary assessment (Section 3.1.2), could test this hypothesis.

Appendix no 1: THE RUDIMENTS OF GOOD DIET

The recommendations described below are mostly gathered from two documents: the World Health Organisation report titled "Diet, nutrition and the prevention of chronic diseases" (WHO 1990) and the Department of Health (U.K.) report titled "Dietary Reference Values for Food Energy and Nutrients for the United Kingdom" (DoH 1992). Some other sources are also used. Their titles appear in the "References and Bibliography" Section.

A.1.1 Macronutrients

A.1.1.1 Energy

The calculation of the energy requirements was based on two parameters: energy expenditure and energy intakes. For the authors of the more recent DoH (1992) the measurement of energy expenditure was a preferable basis for calculation but the technique that was followed for it, namely the doubly-labelled water method, is very recent and the research done with the help of it and the ensuing data are not so extensive as to cover all the age groups. So, for some age groups like 3-10 years old children only energy intakes were considered.

Both documents give the Daily Estimated Average Requirements (EAR) for males and females and for the different ages. The age range is 0-75 years. The energy requirements are given in very close intervals during the first year of life (3 months), longer intervals during childhood and adolescence (2-4 years) and even larger during adulthood. WHO (1990) presents the energy EARs in relation to average weights and for this reason and also due to the fact that the age intervals do not coincide the results are not straightforwardly comparable. However, for both those documents the age with the greatest energy demands is the one between 16-18 years when boys need 11.51-11.9 and girls 8.83-9.00 MJ daily. For the next 40 years the needs come down roughly by 8%, to fall more dramatically thereafter.

The values of WHO (1990) are slightly higher than those of DoH (1992). For instance, the median value of 30-60y males is 10.9 MJ in WHO (1990) whereas the average value for 19-59y males is 10.6 MJ in DoH (1992). The corresponding values for females are 8.8 MJ and 8.1 MJ. The same pattern appears in childhood. Daily average energy requirements for 12-14y boys and girls are 10 and 8.8 MJ respectively in WHO (1990). The same requirements for 11-14y boys and girls are 9.27 and 7.92 MJ respectively in DoH (1992). This trend reflects the concern of the authors of DoH 1992 with obesity. They argue, for instance, that they disagreed with the decision of the authors of WHO (1990) to increase the suggested intakes of children by 5 per cent to allow for a desirable level of physical activity because:

> "Such an addition would not necessarily lead to any increase in activity and so might be conducive to the unwelcome development of obesity." (DoH 1992, p.21)

In calculating the values of energy requirements the authors of DoH (1992) have also taken into account the fact that the British population has a rather low level of physical activity. So this may have been an additional reason for the lower values of energy requirements.

A.1.1.2 Protein

Protein intake is essential for nitrogen equilibrium in the human body. Proteins are structural molecules of cells. They are polymers typically consisting of 100 or more amino acids linked through peptide linkages. There are 20 different types of these structural amino acids of which 10 are characterised as Essential or Indispensable Amino Acids (IAA) because, although necessary for the building of proteins, they cannot be synthesised by the human body but have to be obtained from ingested proteins that contain them. So, protein intakes must be (1) sufficient for the provision of the necessary amounts of amino acids and (2) of such quality as to provide all the IAA. Proteins contained in milk or egg are deemed as high quality proteins, i.e. containing sufficient proportions of all the IAA.

The panel of WHO (1990) used studies measuring nitrogen balance in human body in order to estimate the required amounts of high quality proteins. For children and pregnant and lactating women they increased the requirements so as to allow for body growth and milk production. The panel of DoH (1992) accepted the values given in WHO (1990) although they recognised that the technique followed for determining these values have been criticised by some experts. The adoption of a more precise method of calculation of nitrogen requirements was left for the future, once a wider consensus among experts is achieved.

As it is, DoH (1992) puts forward a table with two figures for each age range for people of medium weight. The one figure is the Estimated Average Requirement and the other is the Reference Nutrient Intake (RNI). In a normal distribution of intakes where the EAR is the mean value, the RNI is the point that is two standard deviations above the EAR. The meaning of this value is that, statistically speaking, intakes of this level will meet the needs of 97.5% of the population. The values are tabulated for children, males, females and pregnant and lactating women.

The EARs given in g/day start from 10.6 for babies and go up to 46.1 and 37.1 for 18-year-old boys and girls respectively. From then on there is a very slow decline in needs of the order of 5% in the next 30 years for men only. The needs of women are given as constant in the same period.

WHO (1990) and DoH (1992) are concerned with lower limits of protein intakes only. This reflects the fact that there is no evidence that excess intakes of protein have any detrimental effect on health. In DoH (1992) it is pointed out that only for patients with renal disease does excessive protein intake lead to a deterioration in their condition. In the same document a 'prudent' upper limit of twice the RNI is suggested, which is 1.5 g protein/kg/day.

A.1.1.3 Lipids

Fats and oils usually consist of triesters of glycerol with saturated, monounsaturated and polyunsaturated fatty acids (SFA, MUFA and PUFA respectively). Fats are solid at room temperature and oils are liquid. In the literature the terms fats, oils and fatty acids are very often used as synonyms. Two of the acids that are constituents of fats, namely linoleic acid and alpha linolenic acid, are essential for the building and function of the cellular membranes as well as for some metabolic functions and cannot be synthesised by human body. They are the essential fatty acids. Sources of these acids are the vegetable oils and some fish oils.

Apart from their indispensable role for human life, fats and their over-consumption have been found in many studies to correlate with the occurrence of certain lethal diseases. So WHO (1990) and DoH (1992) suggest a limited fat consumption of fats expressed as a percentage of total taken energy by the overall population. The diseases that have been linked with fat over-consumption are cardiovascular diseases, some types of cancer, obesity and non-insulin-dependent diabetes.

Cardiovascular diseases, and especially Coronary Heart Disease (CHD), are very common in Western developed societies and for many countries they constitute a major cause of morbidity and mortality. Both of them have been correlated with fat consumption through epidemiological and clinical studies. Cardiovascular diseases include CHD, the cerebrovascular diseases and the different peripheral vascular diseases. The mechanisms through which these diseases develop are **atherosclerosis,** i.e. the formation of plaque consisting of oxidised cholesterol and other lipids on the arterial walls leading to the narrowing of the artery, and arterial **thrombosis**, i.e. the occlusion of an artery by a thrombus (blood clot). The risk factors contributing to these mechanisms are high blood pressure and high serum cholesterol[1] concentration for atherosclerosis, and the increased concentrations of "Factor VII" and fibrinogen for thrombosis. The development of these factors depends on genetic as well as habitual-environmental conditions. WHO (1990) and DoH (1992) give an overview of these habitual-environmental conditions and especially those having to do with fat consumption:

1. Total cholesterol and LDL cholesterol concentrations in blood increase as the amount of SFA intakes increase.

2. Increased PUFA intakes decrease total and LDL serum cholesterol while increased intakes of a special type of PUFA named n-3 inhibit thrombus formation.

3. MUFA intakes have not been shown to affect serum cholesterol.

4. Total fat (independently of SFA consumption) has not been shown to affect

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[1] Cholesterol is a lipid consumed with animal fat. Dietary cholesterol must be distinguished from serum cholesterol, which is synthesised by the body. There are two types of serum cholesterol: high-density lipoprotein (HDL) and low-density lipoprotein (LDL). The second one contributes to the formation of atheroma. Fat from plants is cholesterol-free.

serum cholesterol levels.

5. There is some evidence that total fat (independently of SFA consumption) may have some effect on thrombogenic factors.

6. Dietary cholesterol has a small effect on serum cholesterol levels.

7. Anti-oxidant vitamins can inhibit the uptake of LDL by macrophages and the consequent formation of plaque.

In the light of this evidence both documents suggest limited intakes of saturated fatty acids.

Cancer is another common disease which in developed countries accounts for around one quarter of all deaths. In WHO (1990) it is pointed out that:

> "The relationship between specific dietary components and cancer are much less well established than those between diet and cardiovascular diseases..."

However:

> "... some epidemiologists estimate that 30-40% of cancers in men and up to 60% of cancers in women are attributable to diet" (WHO 1992, p. 62)

Breast cancer is correlated to the intake of fat, energy and foods like milk and beef. However, not all epidemiological evidence, case-control studies and cohort studies have shown these correlations. The first indications about the relationship of diet to colorectal cancer were drawn by comparing different types of diet internationally. Diets high in fat and low in fibre, i.e. diets common in the western developed countries, were positively associated with this type of cancer. This correlation was strengthened by the fact that in southern Africa where people eat a lot of plant foods this disease is rare. Further studies have suggested that it is mainly high SFA, high MUFA and high meat intakes that are most likely to induce colon cancer. However, not all the studies have concluded the same results. Other types of cancer that have been correlated to high fat intakes are prostate cancer and cancer of the pancreas. In the light of this as yet inconclusive evidence the panel of DoH (1992) did not suggest a limited intake of fat for the prevention of cancer. However, increased intakes of fat are not recommended either.

Obesity is sometimes seen as ill health and sometimes as a risk factor. It is associated with non-insulin-dependent diabetes, hypertension, gallstones, and breast, endometrial, prostate and kidney cancer. Obesity is usually measured by the Body

Mass Index (BMI) which is defined as the weight in kg, divided by the height in meters squared. As this measure does not take into account the distribution of body mass nor the muscularity or the balkiness of bones it is more useful for describing the average condition of a population rather than individuals. Groups of people with average BMI between 20 and 25 are considered as having normal weights. Obesity is attributed to genetic as well as habitual-environmental causes and it occurs when energy expenditure is lower than energy intakes.

There is some epidemiological evidence that shows a surprising negative correlation between energy intake and BMI. However this correlation becomes negligible when fat intake is taken into account. In WHO (1990) it is supported that "dietary fat is particularly conducive to weight gain". DoH (1992) however points out that fat is both positively and negatively correlated to BMI in two epidemiological studies. In the article that is cited as showing a negative correlation, however, (Keen *et al.* 1979) this correlation is not persistent in all groups and in some other groups it is not significant.

Seen from a biological point of view, fat gives more energy per mass unit than any other nutrient. That means that a given bulk of food consisting mainly of carbohydrates represents less energy intake compared to the same bulk of food consisting mainly of fats. So, satiety is achieved with less energy intake when the food contains few fats. It has been also found that carbohydrate-rich diets trigger mainly oxidation whereas fat rich diets favour fat storage. Finally, one more reason according to which fat induces obesity is put forward by DoH (1992):

> "...fat is palatable. This may be conducive to increased food energy intake in some individuals with a genetic or behavioural predisposition" (DoH 1992 pp 53-4)

As for **non-insulin-dependent diabetes**, although its management is achieved through dietary restrictions, there is no evidence that it is caused by energy or nutrient intake independently of obesity. So its prevention should be pursued through the prevention of obesity.

In the light of this evidence WHO (1990) and DoH (1992) suggest that total fat intake should not exceed a certain percentage of total energy intake. This percentage would ideally be 30%.

> "However, practical considerations in some developed countries suggest that it would be sensible to have an intermediate shorter-term target of 35% as the upper limit, to allow the changes in the food and agriculture industries to occur progressively without any major disruption caused by extreme and abrupt changes in policies" (WHO 1990 p.92).

The 'pragmatic' upper limit of 35% is endorsed by DoH (1992), and an alternative value of 33% is given whenever alcohol consumption is taken into account. Both documents agree that SFA should provide no more than 10% of the total energy and the respective values for MUFA and PUFA should be 12% and 6%. Finally, trans-fatty acids[2] should not be taken in a percentage higher than 2%.

As for lower limits, WHO (1990) suggests that total fatty acid intake should not fall below 5-10% of energy intakes with SFA representing 3-5% of energy intakes. Of course, these lower limits have no practical application for developed countries where the fat intakes are of almost another order of magnitude.

A.1.1.4 Carbohydrates

Edible carbohydrates include three categories: sugars, starches and non-starch polysaccharides (NSP) that are usually identified with dietary fibre. The molecules of all these compounds consist of two or more molecules of glucose. Glucose is the basis of nutrition because it is the main body fuel and it contributes to many other chemical processes in cells. Humans, like all animals, obtain glucose from edible sugars and starches. If there is a shortage of them, the limited resources of glycogen are used to produce glucose and lastly protein and fats are metabolised into glucose. However, this last process is associated with the formation of ketoacids. In prolonged periods of shortage of carbohydrate intakes the ketoacids accumulate in the blood causing ketoacidosis, a disturbance of the blood's pH, a very serious condition that

[2] Unsaturated fatty acids appear in two geometrical isomers: cis- and trans-. Cis-isomers are natural products. Small amounts of trans-isomers occur physically. However, they are produced in greater amounts with processes like oil hydrogenation in food industry. There is some evidence that trans-fatty acids may be positively associated to some kind of cancers. DoH (1992) considers this evidence to be inconclusive but suggests a prudent low intake.

can ultimately cause death. So, although glucose can be produced by other macronutrients as well, the consumption of carbohydrates is nonetheless essential.

SUGARS

DoH (1992) distinguishes two types of sugars: intrinsic sugars which are incorporated in foods such as milk and extrinsic sugars which is the additive sucrose. Intrinsic sugars have not been shown to have any adverse effect on health. Uncontrolled use of extrinsic sugars, however, has been repeatedly reported to lead to dental caries and obesity. Dental caries, which is very common in children who consume great quantities of sugar, can be partially controlled with fluoridation of water. Obesity, though, is a problem the management of which is notoriously difficult. It affects people of all ages and as mentioned in Section A.1.1.3 it can contribute to hypertension, non-insulin-dependent diabetes and cardiovascular diseases. When extrinsic sugars are taken in amounts that approach or exceed 30% of energy intakes, then lipid, insulin and glucose concentration in the blood become dangerously elevated. Usually sugar and starches are eaten in complementary quantities, i.e., when much sugar is consumed starch intake is low and vice versa. Starch coming from legumes, vegetables and cereals is combined with many micronutrients like vitamins and minerals. So, over-consumption of extrinsic sugars may finally lead to diets poor in vitamins and minerals.

WHO (1990) suggests a maximum intake of sugars representing 10% of energy. Older people in particular are advised to eat even less because, although their energy requirements are smaller, their needs for nutrients like proteins, iron and calcium remain unaltered or even increase. DoH (1992) agrees with this upper limit but only for extrinsic sugar, setting no upper limit for intrinsic sugars. None of the documents sets a lower limit, thus denoting that sugar is not essential for human nutrition.

STARCHES

Starches appear in two components: amylose and amylopectin. Starch granules contain both these components. To be digested starch has to be heated; thus the granules are broken up and starch is released in soluble and digestible form. Digestion occurs when the bonds that link the glucose molecules, the so-called α-glycosidic bonds, are hydrolysed and glucose is produced. When left to cool down starch partly recovers its crystalline form and it becomes less digestible. This is called resistant starch.

It is generally accepted that diets rich in complex carbohydrates prevent the risks associated with the consumption of large amounts of fats. WHO (1990) refers to starches as complex carbohydrates and suggests that energy from them should make up 50-70% of energy needs. DoH (1992) recommends that since fat and protein should cover 37% of energy requirements starch should cover the rest of it.

NON-STARCH POLYSACCHARIDES (NSP) AND FIBRE

Fibre was at one time defined as indigestible polysaccharides as opposed to starch that is digestible. Today, however, we know that resistant starch is not digested and that some fibre can be digested in the large bowel. So there is a need of a less physiological and more chemical definition of fibre.

Fibre varies with the food in which it is contained. Generally speaking, it consists of Non-Starch-Polysaccharides (NSP) and lignin. The greater parts of NSP are polymers of glucose joined by β-glycosidic bonds. They are partly fermented in the large bowel to give short chain fatty acids and methane.

Many studies have related the lack of dietary fibre with constipation. This is an undesirable condition and a risk for bowel diseases like colon cancer and diverticular disease and for gallstones. A small mean weight of daily stool is used as a measure of constipation. It has been shown in experimental studies that the consumption of NSP in amounts between 4 and 32 g per day and the mean weight of stool are almost directly proportional (WHO 1990, p.77). In DoH (1992) it is stated that, apart from keeping the lower intestine healthy, dietary fibre has been found to be negatively correlated to CHD. Especially soluble NSP from beans and oats has been found to lower the ratio of LDL:HDL (see footnote 1).

With a view of keeping the average stool daily weight above 150 g/d WHO (1990) suggests a dietary reference value of 22g/day, whereas DoH (1992) recommends a more pragmatic value of 18g/day. A warning is given in both documents that diets rich in fibre including unprocessed wheat bran may reduce the bioavailability of minerals like calcium, iron, zinc and copper due to excessive amounts of oxalate and phytate.

A.1.2 Micronutrients

A.1.2.1 Vitamins

Vitamins are organic compounds of various structures that are found in very small quantities in foods. They are absorbed in the small intestine and they do not yield energy but are involved in different metabolic functions in the cells. Their discovery was associated with the treatment of different diseases around the start of the twentieth century. Since then their role and function is better understood but still not completely clarified. There are different ways of categorising vitamins. One is by their solubility in fat or in water. Most of them are water-soluble, but vitamins A, D, E & K are fat-soluble.

Vitamin A helps the growth and differentiation of the tissues. Its deficiency causes xeropthalmia and blindness, reduces resistance to infections and increases mortality. Vitamin A is spread in central and eastern Africa, South Asia and Brazil. It is found in liver, fish oils and dairy food while its precursor (β-carotene) is found in carrots and spinach. WHO (1990) and DoH (1992) stress out the importance of this nutrient and DoH (1992) suggests an EAR of 496 and 402 mg/day for men and women respectively. In excess, vitamin A is teratogenic and it is suggested that pregnant women avoid supplements of it as well as eating liver. WHO (1990) mentions that diets low in fat may reduce vitamin A absorption.

Vitamin B_1 (thiamine) is connected with the cure of beriberi. It is needed for carbohydrate, fat and alcohol metabolism. It is found in wheat or rice germ, yeast extract, wholemeal flour, liver, kidneys and heart. EAR is set at 0.3 mg/1000 kcal of energy by DoH (1992).

Vitamin B_2 (riboflavin) is involved in oxidative processes, i.e., electron transport in cells. Its deficiency causes lesions in the mouth and skin. It is found in yeast extract, liver, eggs and dairy products. The EAR is set at 1 and 0.9 mg/day for men and women respectively in DoH (1992) but it is recognised that a recent survey shows that British people intakes are greater by far. There is no danger of adverse effects from greater intakes since its absorption is low.

Vitamin B_3 (niacin) is part of the coenzymes NAD & NADP which function as hydrogen acceptors. Its deficiency may cause pellagra, skin 'sunburns' and diarrhoea. It is found in meat, wholemeal bread, yeast extract and liver. EAR: 5.5 mg of niacin/1000 kcal of energy intaken. In very high dosages niacin reduces endogenous synthesis of serum cholesterol and induces glucose intolerance.

Vitamin B_5 (pantothenic acid) helps in the catabolism of carboxylic acids. It is found in most foods, hence its name (pantothen > πανταχόθεν), which in Greek means everywhere. There is no evidence of deficiency.

Vitamin B_6 (pyridoxine) in its phosphorylated form acts as a coenzyme for protein, amino acid and fatty acid metabolism. As with vitamin B_5 it is found everywhere and its deficiency is rare.

Vitamin B_{12} (cyanocobalamine) act synergistically with **folate** in the synthesis of amino acids and the formation of red blood cells. Their deficiency cause anaemia. Vitamin B_{12} is found in animal foods hence its deficiency is sometimes observed among vegans. Folate is found in liver, green vegetables and white fish.

Biotin is another vitamin that is found in many foods and there is no evidence of its deficiency. It acts as a coenzyme in many metabolic reactions.

Vitamin C (L-ascorbic acid) plays a role in the synthesis of collagen fibre and in the absorption of non-haem iron. It also acts as an anti-oxidant and as pro-oxidant. Its deficiency causes scurvy, weak and bleeding skin and gums, anaemia and heart failure. It is contained in citrus fruits, green vegetables, potatoes and tomatoes. Possible risks from overdoses are diarrhoea, increased production of oxalate (believed to form kidney stones) and possibly scurvy when the overdoses stop. Vitamin C is very sensitive to heat, oxygen, metallic ions, high pH and light. This means that a great part of it contained in foods is destroyed during handling, processing and storage of foods. It is estimated that 70-80% of L-ascorbic acid contained in cow milk is destroyed before reaching the consumer (Roig *et al*, 1993). Fruits and vegetables having short periods of storage, minimal processing and careful handling are less likely to lose much of their vitamin C content. However, their consumption has declined in recent years in favour of fruit juices and soft drinks (ibid p.66). For this reason nectars and fruit juices are now fortified with vitamin C.

Vitamin D regulates the absorption of calcium from the digestive tract. It is therefore essential for bone mineralisation. Its deficiency leads to rickets and osteomalacia. It is produced by the action of U-V radiation of sun on lipids in the skin. It can also be obtained by the consumption of foods like fish oils, eggs and margarine.

Vitamin E has an antioxidant role. Its deficiency causes anaemia and haemolysis of red blood cells. Usually, foods rich in PUFA contain substantial quantities of vitamin E. Its deficiency is very rare.

Vitamin K helps in the synthesis of clotting factors. Its deficiency leads to bleeding syndrome, cervical haemorrhage and death. There is no evidence of vitamin K deficiency in adults. For the avoidance of the vitamin K deficiency that happens with a small number of babies DoH (1992) suggests the prophylactic provision of a minimum amount of it to all new-borns.

In recent years a public debate has been launched concerning the beneficial effects that the consumption of large quantities of vitamins may have on people's health. J.A. Olson gives a very vivid portrayal of the impact that this debate has on lay people:

> "Fantasies among generally healthy persons that large supplements of any single vitamin or combination of them, like some magical amulet, will significantly stave off ill health have captivated a sizable percentage of our population" (Olson 1994, p. 1771S)

The same author maintains that any protective effect of vitamins against chronic diseases like cancer and cardiovascular disease remains, for the time being, uncertain and that people's naive beliefs should be changed through educational messages that present current scientific conclusions. In an article reviewing research on the antioxidant properties of vitamins and their effect on cancer prevention Burr finds that if epidemiological surveys reveal anything it is that there is a consistent negative association between fruit and vegetable consumption and the rate of cancers of the gastrointestinal tract. However, this relationship can hardly be attributed to individual antioxidant nutrients like vitamin C or E only as there are a great number of micronutrients in these foods which play a role not yet clarified. He concludes that:

> "Perhaps recent thinking has been too simplistic in concentrating on individual antioxidants. People eat food, not isolated nutrients, and the difference may explain the disappointing results of randomised trials of antioxidants in contrast to the hopeful associations shown by dietary studies." (Burr 1994, p.413)

WHO (1990) and DoH (1992) fall in with the view expressed in these two articles and do not recommend supplements of excessive intakes of vitamins. The essentiality of vitamins and their distribution in different foods calls for the consumption of a wide variety of foods. Only for those people who for particular reasons abstain from some groups of foods (e.g. animal foods) is the provision of supplements recommended.

A.1.2.2 Metals and non-metals

Calcium is mainly found in bones and teeth and plays a role in cellular structure, metabolism and signal transmission. Its deficiency can cause poor skeletal growth and rickets. It is consumed in milk and hard water. DoH (1992) stresses that bone health cannot be achieved by regulating calcium intakes only but by other nutrients as well like proteins, energy etc. Prevention of menopausal osteoporosis can be managed with the supplementation of oestrogens that increase calcium absorption.

Magnesium is also a structural element of bones and a cofactor in many enzymes. Its status in the body is controlled by homeostatic mechanisms in conjunction with calcium. There is no evidence of magnesium deficiency. According to DoH (1992) there is no conclusive evidence that low magnesium intakes constitute a risk factor for heart disease.

Phosphorus is another structural element of bones. It is also a component of nucleic acids, proteins and phospholipids and it is found in cellular membranes. It plays a vital role as a component of adenosine triphosphate (ATP) in the exchange of energy in most cellular reactions. It is found in all natural foods and there is no practical risk of deficiency.

Sodium and **potassium** cations are vital for establishing the electrochemical gradients across cell membranes, which in turn control the movement of various substances across membranes. There are homeostatic mechanisms which control the differential concentrations of these two cations in the extracellular fluids and in the cytoplasm. Sodium is mainly found in salt as sodium chloride while potassium is present in most foods. Many epidemiological studies have shown a positive correlation between high sodium (i.e. salt) intake and high blood pressure. Other studies have correlated high salt intake with stomach cancer. In the light of this evidence WHO (1990) recommends a salt intake lower than 6 g daily with no lower limit. DoH (1992), on the other hand, finds the above evidence inconclusive and recommends a salt intake of between 1.5 and 4 g daily.

Chlorine has a similar role to sodium and potassium in the regulation of electrochemical gradients and it is also a constituent of hydrochloric acid found in gastric fluid. It is found in many inorganic substances like sodium chloride. Its deficiency causes muscular cramps.

Iron is a component of haemoglobin, myoglobin and different enzymes which are involved in the oxidation of fatty acids, in respiration and in oxygen carriage. Iron deficiency causes low physical and mental performances and anaemia. It is also associated with low immunity especially among children. This is a problem for many countries in Africa, Asia and S. America and in some industrialised countries too according to WHO (1990). Sherman (1992) stresses that "iron deficiency is the most prevalent nutritional disorder in the world and because it is most common in women of reproductive age and their children, the implications of dysfunctional immunity resulting from iron deficiency are vast". Iron included in meat is more readily available than that in cereals, especially in the absence of vitamin C. Phytate and lignin found in fibre can also impair iron availability. Brune and associates (1992) suggest that prolonged fermentation of products containing phytate increases the bioavailability of iron contained in them.

Zinc is component of many enzymes which contribute to the metabolism of all the macronutrients. Its deficiency may cause growth retardation, low immunity and defective tissues. In great dosages it reduces copper availability. Zinc is found in red meats and unrefined cereals.

Copper is also a component of enzymes involved in oxygen and electron carriage. Its deficiency may cause leucopoenia, skeletal fragility, susceptibility to infections and, if prolonged, anaemia. It is found in most foods.

Selenium is part of the enzyme called GSHPx which protects against oxidative damage. Its deficiency may cause cardiopathy. It is contained in certain amino acids found in cereals, meat and fish.

Molybdenum is part of an enzyme involved in DNA metabolism. Its deficiency may cause albinism. It is found in most foods.

Manganese is also a component of enzymes which control bone growth and fatty acid metabolism. Its deficiency is rare.

Chromium enables insulin action. Its deficiency is rare.

Iodine is part of the hormones which control metabolic rate. Its deficiency causes goitre, and in some cases children with cretinism are born from iodine-deficient mothers. Milder deficiency may impair intellectual ability and work capacity. It is found in seafood and salt. According to WHO (1990), iodine deficiency depends on the type of food and water. Areas with high incidence of iodine deficiency are the Andes, Alps, Gt Lakes basin in N. America and the Himalayas. Iodination of table salt is recommended.

Fluorine has an ancillary role in bone mineralisation and protects against dental carries. It is estimated that the addition of 1 mg/kg to drinking water reduces tooth decay in children by 50%. WHO (1990) and DoH (1992) recommend fluoridation of water supplies, salt, milk and toothpaste.

Appendix no 2: MATERIALS OF THE INTERVIEWS

A.2.1 Materials of the first series of interviews

A.2.1.1 Schedule of the interview

Q. 1
Do you feel healthy?

Q. 2
Why do you say that?

Q. 3
What is health?

Q. 4
Are you interested in remaining healthy?

Q. 5
Do you do anything for it? What?

Q. 6
How did you learn that these are the right things to do in order to remain healthy?

Q. 7
Had you ever had queries about matters of health?

Q. 8
Can you give me an example?

Q. 9
Where did you imagine getting the answers? In what subject?

Q. 10
Did the school give you any answers? In what subject?

Q. 11
Imagine that two of your friends dispute. One of them insists that:

"we must live according to some rules in order to be healthy"

and the other one asserts:

"it is mainly our make up that determines how healthy we are going to be and our habits do not count that much"

What would you say to them?

Q. 12
Did you learn it in the school? In what lesson?

Q. 13
Can you complete this sentence: the phenotype depends on the genotype and...

Q. 14
Has it anything to do with your previous answer?

Q. 15
Are you happy with the way that you feed?

Q. 16
Did you ever feel that you have to change it?

Q. 17
For what reason and in what direction?

Q. 18
Do you find it easy or you have to try hard, what are the obstacles?

Q. 19
Have you sacrificed some things?

Q. 20
Which are the causes of human diseases?

Q. 21
Which are the common diseases?

Q. 22
Which are the greater killer diseases?

Q. 23
How do we get to know about the causes of diseases?

A.2.1.2 Tables containing summaries of the responses of the interviews

In the tables that follow in the next pages, the columns correspond to cases (interviewees) and the rows to questions.

CASE	1	2	3	4	5	6	7
NAME	Andreas	Perikles	Vasso	Nikos	Yannis	Makis	Dimitris
SEX	Boy	Boy	Girl	Boy	Boy	Boy	Boy
AGE	18	16	17	17	17	17	23
STAGE	3rd Lyc/1d	3rd Lyc/3d	3rd Lyc/2d	3rd Lyc/2d	3rd Lyc/1d	3rd Lyc/1d	Nursing sch.
FAVOURITE LESSONS	Science, Math.	Math., history	Biology	Biology, physics, chemistry	Physics	Drawing, chemistry, composition, astronomy, geography	
OTHER FEATURES		Athlete coming from athletic family					
Q. 1	Yes	Yes!	Yes	Yes	Generally yes. Born with meniscus, operated	Externally yes. Internally I don't know.	Absolutely
Q. 2	No problem, Physically active	Physically active, neither drinks nor smokes.	No diseases, although I neglect exercise	I've always tried to achieve bodily and mental balance.	Don't feel tired after a working day. Cope with school's demands, daily exercise	I feel healthy. No disease for a long time	I feel well in my body and mentally. I have no stress or pain
Q. 3	Feel good internally and externally	Given by God, we maintain it or improve it. Means being in good form able to sleep, no pain, depends on way of thinking	No bodily or mental problems, good quality of life	No bodily problem and mentally free. Nothing to bother you.	No bodily or mental problems, i.e. no pain or mental problems.	There is health of the body, the psyche, the mind.	Mental and bodily well-being

TABLE A.1a: Responses to the first series of interviews

CASE	1	2	3	4	5	6	7
Q. 4	Of course	Of course	Of course	Of course	Of course	Yes	Of course
Q. 5	Basketball Good diet	No drinks at all, no smoking, good moderate diet, much exercise, sleep	Good nutrition (little meat & sweets, much fruit and veg., home made food) exercise good form	I would like to exercise, no time left. I do my best in diet and protection from infections	Right diet: fruits, Greek cuisine (unique), legumes, variety, not many meats, daily exercise, no sitting up late. Athletic life	No	My diet, no smoking or drinks, I walk, work, feel no problems
Q. 6	Observing me and others	Observing other people. Our grannies' longevity due to their healthy life. Scientists say...	Parents, as if I knew all the time	Family instructions and personal knowledge	Grown ups, books, television, athletes' and scientists' interviews		From the models highlighted in the media. I can judge what is detrimental to health
Q. 7	No	Many	Yes	Yes	Yes	Seldom, when I see TV programmes	Too many
Q. 8		AIDS, and the body's physiology	How healthy are some foods	I feel endangered from different diseases: AIDS	I don't know how good some gym exercises are. A fear about some troubles (headache) About cancer and AIDS	No	The development of cancer
Q. 9		If there was a lesson in school. From a chemist and a doctor my parents and my PE teacher		My queries are not this important to ask somebody	Ask a specialised doctor		From my school and my experience

TABLE A.1b: Responses to the first series of interviews

CASE	1	2	3	4	5	6	7
Q. 10	Yes Home economics	Formally not. Some projects only	No Perhaps Biology Primary school	No, there is no such subject. In the primary school about teeth hygiene	Formally no. Some leaflets only by others distributed in school	Immediately by chance only in dialogues with some teachers of any subject	I used to ask my teachers, but the formal syllabus didn't help
Q. 11	Agree 1	50-50	50-50	Partly with the 1. Disagree with the 2.	1. The 2nd is not absolutely right.	With nobody. The deviation from the rules may be ruinous. Health depends on character and this is formed after birth	Midway. There must be a predisposition in metabolism but we must obliterate the causes of bad health
Q. 12	Don't remember	No, my experience	Yes	Yes, Biology	No	No Its personal view	Partly. Mostly from personal queries
Q. 13	-	Chromosomes	Environment	Environment	-	-	Caryotype
Q. 14	-	Biology	Biology	Biology	Biology	Biology	
Q. 15	Yes	Yes	Yes	Generally yes	Not this much	Very scientific	
Q. 16	Yes	Yes	No	Yes	No	No	Not absolutely
Q. 17	When reduced activity, had to eat less	I put on weight and had to eat less		More fruit and veg. and somehow less meat because it gives cholesterol		Yes. I ate fast casual food with sauces. Now I drink much milk, fruits, chicken, fishes	Yes, more natural diet with nutrients missing now
Q. 18	Yes	Yes		No, I'm not in charge of it		No, I wanted it a lot	Very easy
Q. 19	No	No		Yes, I don't find them palatable		No, I've not thought of it	No, that's my pleasure

TABLE A.1c: Responses to the first series of interviews

CASE	1	2	3	4	5	6	7
Q. 20	Viruses surround us	Microbes, done by dirt and carrions and susceptibility to diseases	Heredity, environment, pollution, bad diet	Infection, toiletes intercourse. Microbes. Pesticide residues. Crowding. Technology. Environment imbalance.	Viruses, polluted environment, bad diet, smoking, drinking, sleepless nights	People think that the lives we drive. I don't agree. Disease must be hereditary which grows with aging	From internal (tissue deteriorations, mutations, infections) and external factors (radiation casualties)
Q. 21	Influenza, measles	Influenza, thalassaemia, cancers	Cancer, AIDS, influenza, viruses	AIDS, cancers. 3rd world: cholera, dehydration starvation	AIDS, cancers. Asian influenza, cholera	Cancer, AIDS, and some more horrible	Venereal and cancer
Q. 22	AIDS, cancer	Cancer and AIDS	AIDS, cancer	AIDS, cancers, infections, allergies	AIDS, cancers	Cancer though there are ways of treatment	Cancer and road accidents
Q. 23	No	Microbiology cultivation of viruses	-	Symptoms' scrutiny, the patient's history, Statistics	- (Describes cancer's development at cellular level)	- (Describes the treatment of cerebral cancer)	Statistics and laboratory research

TABLE A.1d: Responses to the first series of interviews

A.2.2 Materials of the second series of interviews

A.2.2.1 Schedule of the interview

Q. 1
Can you imagine somebody whom you think of being healthy? What do you see in him/her that makes you say that? Or what do you think makes people healthy?

Q. 2
What do you understand by health?

Q. 3
Do you think that keeping healthy is important?

Q. 4
What do you do to keep yourself healthy?

Q. 5
Do you take care of your diet? For what reasons?

Q. 6
To be asked only if the previous question is answered negatively.
Which is the sentence that best describes your dietary habits?

a. I just eat whatever and whenever I want

b. I just eat and keep active

c. The important thing is to enjoy eating

d. I always wanted to have a healthy diet but I haven't managed it so far

Q. 7
Can you tell me what sorts of things do you eat to keep yourself healthy?

Q. 8
Why do you think that this kind of diet is the right one for you?

Q. 9
Did you ever feel that you have to change your diet? For what reason and what would you do?

Q. 10
What causes human diseases?

Q. 11
Which are the most common diseases?

Q. 12
Of what causes do most people die in this country?

Q. 13
Imagine that two of your friends dispute. The one of them insists that:

"We must live according to some rules in order to be healthy"

and the other one asserts:

"It is mainly our make up that determines how healthy we are going to be and our habits do not count that much"

What would you say to them?

Q. 14
Here is the plate of healthy diet which is recommended by today's dietitians.

What does this plate tell us?

Q. 15
Why is it as it is?

Q. 16
Here is a table taken from a World Health Organization report. Can you understand this table?

Q. 17
Do you trust these findings?

Q. 18
If you were a dietician what advice would you give to young people who do not understand what these nutrients meant in order to feed according to this table?

Q. 19
What would be the results if these recommendations were adopted?

The National Food Guide

The Balance of Good Health

IMAGE REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

[redacted]

Figure 5: The balance of good health or the 'HEA plate'

Site of cancer	Fat	Body weight	Fibre	Fruits and vegetables	Alcohol	Smoked, salted and pickled foods
Lung				-		
Breast	+	+			+/-	
Colon	++		-	-		
Prostate	++					
Bladder				-		
Rectum	+			-	+	
Endometrium		++				
Oral cavity				-	+[b]	
Stomach				-		++
Cervix				-		
Oesophagus				-	++[b]	+

TABLE A.2: The first 'WHO' Table; Associations between selected dietary components and cancer. ([b]) Denotes synergistic with smoking.

A.2.2.2 Brief transcription of an interview

Name: George (In tables appears as case 4)

Age: 15

Favourite lesson: Arts

Wants to become: Design, architecture.

Q. 1
Someone like Christie, fit, lot of athletics, training, eats well, good diet.

Q. 2
Being fit, knowing what you are eating, having a good diet, your body in good shape. Health is when your body works well, not many illnesses. Good body.

Q. 3
Very important.

Q. 4
Sports, try not to eat too fatty foods and eat fruit.

Q. 5
Not particularly concerned, (probe) balanced diet to get the nutrients.

Q. 7
Quite a lot of meat, fish, vegetables, fruits, milk. Lots of Mars bars when I take a lot of activities.

Q. 8
I need a lot of meat to get the energy for the sports, vegetables to get the iron.

Q. 9
Not really.

Q. 10
Pollution, bad diet, infected food.

Q. 11
AIDS, cold, food poisoning.

Q. 12
Heart disease, smoking, bad lungs.

Q. 13
Agree with the first one. Eat what you like but you have to have some good food as well, balanced diet.

Q. 14
You need an assortment of different foods, need more of fruit and veg. than meats and ... you need more bread and potatoes but the combination is the thing that makes a good diet.

Q. 15
You get certain diseases when you have lack of those things you need a balanced diet.

Q. 16
How the things you eat affect the certain parts of your body that ... cancer. (probe) lot of fats can cause cancer in large intestine and also prostate. (probe) fruits and veg. have no association with cancer you can eat them.

Q. 17
Yes I think so. Bigger people and smokers are more likely to get cancer.

Q. 18
First cut down smoking. Limited amount of alcohol. Not much fatty foods but in balance with fruits and vegetables, a lot of fibre. (From where?) Bread and cereals.

Q. 19
Less likely to take cancer, they will have a healthy body; they will be more able to do sports.

A.2.2.3 Tables containing summaries of the responses of the interviews

In the tables that follow, the columns correspond to cases (interviewees) and the rows to questions.

Case			1	2	3	4	5	6	7	8
Definition of health	Positive		+	+		+	+	+	+	+
	Negative				+	+	+			
	Psyche			+			+			
	Mind			+			+			
	Body		+	+	+	+	+	+		+
	Healthy living		+	+		+			+	+
Common diseases	Infectious		+	+	+	+	+	+	+	
	Degenerative		+					+	+	
Common lethal diseases	Infectious						+			
	Degenerative			+	+	+	+	+	+	+
Factors of health	Heredity						+	+		
	Environment		+	+/-	+	+	+	+	+	+
Causes of dis- eases	Infections		+	+	+	+		+	+	
	Habits	Diet	+	+		+			+	+
		No exercise							+	
		Smoking						+		
		Sun exposure						+		
	Suscep tibilty	Heredity						+		
		Low immunity					+			
	Pollution					+				
	Confusion with diseases		+	+		+				

TABLE A.3a: Responses of the second series of interviews regarding the meaning of health

Case		1	2	3	4	5	6	7	8
What they do to keep healthy	Exercise	+	+	+	+	+	+	+	+
	Body cleaning	+	+	+					+
	Mentally allert		+						
	Take care of diet	+	+		+				+
And diet? (Prompt)	Yes								
	No						+	+	
	Sometimes/Try			+		+	+	+	+
	No possibil. of choice	+				+			+
Why they care about their diet	To get the nutrients	+			+				
	To be able to exerc./get energy				+		+		+
	To generate muscles							+	+
	To avoid skin spots								+
	To avoid damaging teeth								+
	There are good and bad things for you		+	+					

TABLE A.3b: Responses of the second series of interviews regarding interviewees' health-related habits

Case		1	2	3	4	5	6	7	8
General description	Variety	+			+				
They eat	Bread & cereals			+					
	Fish				+				
	Fruits				+				
	Mars bars				+				
	Meat				+			+	
	Milk				+				
	Pasta								+
	Stodgy foods						+		
	Sweets						+		
	Vegetables		+		+			+	+
They eat moderate	Chips			+					
	Meat	+	+						
They avoid	Fatty foods							+	
	Snacks					+			
Thinking of changing their diet?	Food in school canteen not good	+							
	Food in school canteen is not enough					+			
	Scientists say? No thanks		+						
	No				+			+	
	More vegetable					+	+		
	Less sugars, chocol.						+		+

TABLE A.3c: Responses of the second series of interviews regarding interviewees' dietary habits

Case		1	2	3	4	5	6	7	8
Recog-nised...	the foods	+				+			
	the variety		+		+		+	+	
	the proportionality	+			+		+	+	+
	the importance of some foods				+				+
	a message (eat so..)			+					
	a trend (low fat stuff)					+			+
Ex-plained it on the grounds of..	providing the nutrients	+	+	+					
	providing the right amounts of nutrients					+			
	lack of those foods cause diseases				+				
	foods physiology depends on the nutrients							+	
	a concept e.g. "balance"								+
	expressed misconceptions							+	

TABLE A.3d: Responses of the second series of interviews regarding the message of the 'HEA plate'

Case			1	2	3	4	5	6	7	8
Interpreting the table	Decreasing the chance of getting cancer		+		+			+		+
	Some foods cause cancer more than others			+		+	+	+		
	Difficulties to interprete								+	
Do they agree?	Yes					+			+	+
	Somehow		+				+			
	As far as I know			+						
	Yes but didn't understand the aetiology							+		
	I don't know				+					
Recommen-dations	Eat more	No of correct recommendations	2	3	1	3	3	2	5	2
	Eat less		2	6	3	1		4		1
	Eat more	No of faulty recommendations							1	
	Eat less								1	
	Other habits	Correct			2	2	3	2	2	2
		Faulty						1		
Expected outcomes of recommended diet	Decreased chance of getting cancer		+			+				
	Drop in occurrence of cancer						+	+	+	+
	Improvement of general health			+	+	+				+

TABLE A.3e: Responses of the second series of interviews regarding the meaning of the 'WHO table'

A.2.3 Materials of the third series of interviews

A.2.3.1 Schedule of the interview

Preliminary questions:

Name

Age

Hobbies

Favourite lessons

Wants to become

Q. 1
Can you imagine somebody whom you think of being healthy? What do you see in him/her that makes you say that? Or what do you think makes people healthy?

Q. 2
What do you understand by health?

Q. 3
Do you think that keeping healthy is important?

Q. 4
What do you do to keep yourself healthy?

Will the diet come up spontaneously? If it does, Q. 5 and Q. 6 are omitted.

Q. 5
Do you take care of your diet? For what reasons?

Only if a negative response is given we will go to Q. 6, otherwise we continue with Q. 7.

Q. 6
What sentence describes better your diet:

a. I just eat whatever and whenever I want

b. I just eat and keep active

c. The important thing is to enjoy eating

d. I always wanted to have a healthy diet but I haven't managed it so far

After that question we move on to Q. 9.

Q. 7
Can you tell me what sorts of things do you eat to keep yourself healthy?

Since the student has raised the healthy eating without any prompt he/she is unlikely to be intimidated by being asked a rather personal question like this. Some probes may be needed after it for a more detailed description of the eating pattern like What time of the day do you eat that and how much of it?

Q. 8
Why do you think that this kind of diet is the right one for you?

This question can be split into more specific ones like:

Why do you eat a lot of cereals, or

Why do you eat a lot of proteins, or

Why are you a vegetarian?

Depending on the answer given to Q. 7 such questions may come up in other parts of the interview. The interviewer has to be alert for such clues.

Q. 9
Did you ever feel that you had to change your diet? For what reason and what would you do?

Q. 10
What causes human diseases?

Q. 11
Which are the most common diseases?

Q. 12
Of what causes do most people die in this country?

Q. 13
Imagine that two of your friends are talking. One of them insists that:
"We must live according to some rules in order to be healthy"
and the other one asserts:
"It is mainly our make-up that determines how healthy we are going to be and our habits do not count that much"
What would you say to them?

Q. 14
Here is the plate of healthy diet which is recommended by today's dietitians.
Why do you think that the things in the yellow sector are put together?
Put similar questions for the other sectors. (The 'HEA plate' appears in section A.2.2.1.)

Q. 15
Can you give me any reason for the different size of the sectors?

Q. 16
Here is a table taken from a World Health Organization report.
Give it to the student and leave him/her to peer at it for some time
What do you think that this table tells us?

Q. 17
Can you give me the names of diet-related diseases that this table refers to?

Q. 18
Do you agree with what it says?

Q. 19
If you were a dietician what foods would you advise young people who did not understand what fat or fibre mean to eat, according to this table?
This is the opposite procedure from nutrients to foods.

Q. 20
What would be the results if these recommendations were adopted?

Q. 21
Do you think that this advice would be easily adopted? Why?

Q. 22
Do you believe that this advice you have given is safe for your health?

Q. 23
Would you then adopt it? Why?

	Limits for population average intakes	
	Lower	Upper
Total energy	see important footnote [a]	
Total fat (% total energy)	15	25
Saturated fatty acids (% total energy)	0	10
Polyunsaturated fatty acids (% total energy)	3	7
Dietary cholesterol (mg/day)	0	300
Total carbohydrate (% total energy)	55	75
Starch (% total energy)	50	70
Dietary fibre (g/day)	27	40
Sugars (% total energy)	0	10
Protein (% total energy)	10	15
Salt (g/day)	0	6

[a] Energy intake needs to be sufficient to allow for normal childhood growth, for the needs of pregnancy and lactation, and for work and desirable physical activities, and to maintain appropriate body reserves of energy in children and adults.

TABLE A.4: The second 'WHO table' figuring population nutrient goals for the avoidance of diet-related diseases

A.2.3.2 Transcript and coding of answers of an interview

Gender: Girl

Age: 16

Class: 2nd Lyc

Lessons: physics, maths, chemistry.

Wants to become: Civil engineer.

Hobbies: Gym.

Q. 1
Fit and slim body.

Q. 2
Liveliness, good temper, joy.

Q. 3
Yes ... it is.

Q. 4
I don't think about my health, I am afraid of putting on weight, that's why I go to the gym.

Q. 5
I would not say, no.

Q. 6
d.

Q. 7
Homemade food. I once thought of cutting down on fat, but then I had no time.

Q: When do you eat?

In the midday. In the morning I drink milk. When I get hungry in the school I eat something there.

Q. 9
No.

Q. 10
I don't know. From microbes. When food is decayed.

Q. 11
Flu.

Q. 12
Road accidents, cancer, heart attack, stroke.

Q. 13
I agree with the first.

Q. 14
Yellow: Fats

Blue…

Orange: They have starch

Green: They come from plants?

Q: Any common ingredient?

I don't know.

Pink: They have proteins.

Q. 15
How healthy they are ... No. How much we must eat. Because the fatty foods are in a small part.

Q. 16
The percentage of some nutrients, the upper and lower limit we must eat in order to avoid some diseases from eating.

Q. 17
I don't know ... Cancer. I have read that we must eat fruit and veg. and not packed food, to avoid it. No, but I suspect that most of them are related to nutrition.

Q. 18
I agree. Many older people who have high cholesterol are told to avoid salt and fats.

Q. 19
Eat everything but not much.

Q: That is to say?

Eat chicken instead of meat which has much fat, vegetables, not to cook with lots of oils and moderate fats and sugar.

Q. 20
They would not have gorgeous bodies but they would not often get ill.

Q: Do you believe that this kind of diet makes not so good bodies?

No, if you want to have a perfect body you must eat minimal fat and sugar.

Q. 21
If they started so, if they were not accustomed to a bad diet, yes.

Q. 22
I think so, although I am not a doctor.

Q. 23
If I could I would.

Q: But you cannot.

No.

Q: Why?

I cannot abstain from sugar.

Q: What else is difficult for you to follow?

Total fat which is 15 and salt. I don't know how much this represents ... but.

Q: What fatty foods do you eat?

All the packed foods, cheeses and ham have fats.

ASPECTS OF HEALTH	Positive	Fit and slim body Q. 1 Liveliness, good temper Q. 2
	Negative	
TYPE OF HEALTH THAT COUNTS	Of the body	Fit and slim body Q. 1 I don't want to put on weight Q. 4
	Psycho-mental	Liveliness, good temper Q. 2

TABLE A.5a: Coding of answers of an interview (third series): The value of health

FOODS ARE CATEGORIZED ON THE BASIS OF ...	components	Eat chicken instead of meat which has much fat Q. 19
	other	<u>homemade</u> food Q. 7 they come from <u>plants</u> Q. 14 <u>packed</u> foods related to cancer Q. 17 and contain fats Q. 23
RESULTS OF HEALTHY DIET ARE EXPECTED IN THE ...	present and imm. future	To have a perfect body eat minimal sugar and fat Q. 20
	remote future	I have read that we must eat fruits and veg. to avoid cancer Q. 16
DIET AND HEALTH ARE RELATED...	causally	... to avoid some diseases Q. 16 ... to avoid cancer Q. 17
	as probability	(people following healthy diets) would not often get ill Q. 20
HEALTHY DIET CAN BE GENERALLY...	promoted by	
	blocked by	Lack of time Q. 7 Bad dietary habits Q. 21

TABLE A.5b: Coding of answers of an interview (third series): Beliefs about food and healthy diet

		HABITS	REASONING/COMMENTS
Dietary	Desired	Takes some care of diet Q. 5 Eats homemade food Q. 6	
	Not desired	Eats sugar fats and salt more than wanted Q. 23	
Non dietary	Desired	I go to the gym Q. 4	To avoid putting on weight Q. 4
	Not desired		

TABLE A.5c: Coding of answers of an interview (third series): Beliefs about the health-related habits

	INFECTIOUS	DEGENERATIVE
Recognised causes or risk factors	Microbes Decayed food Q. 10	
Common diseases	Flu Q. 11	
Common lethal diseases		Cancer Heart attack Stroke Q. 12
Diet-related diseases	Most diseases I think Q. 17	Cancer most diseases Q. 17

TABLE A.5d: Coding of answers of an interview (third series): Beliefs about the nature of diseases

NUTRIENT	RECOGNISES IN FOODS	FOOD RECOMMENDATIONS	VIEWS EXPRESSED ABOUT IT
CARBO-HYDRATES			
Starch	Orange sect.		
Sugar		Eat moderate sugar Q. 19	To have a perfect body eat minimal sugar Q. 20
Fibre			
FAT	Yellow sect. Packed foods, cheeses and ham Q. 23	We must eat few fat Q. 15 Eat chicken instead of meat which has much fat Q. 19 Do not cook with lots of oils Q. 19 Use moderate fats Q. 19	People with high cholesterol must eat little fat Q. 18 To have a perfect body eat minimal fat Q. 20
Saturated fat			
Unsaturated fat			
CHOLE-STEROL			
PROTEINS	Pink sect.		
VITAMINS			
SALT		People with high cholesterol must eat little salt Q. 18	
MINERALS			
OTHER			

TABLE A.5e: Coding of answers of an interview (third series): Knowledge on food composition

	POSITIVE	NEGATIVE
General	Eat everything but not much Q. 19	Eat moderate sugar Q. 19 Eat minimal sugar Q. 20 Use moderate fats Q. 19 People with high cholesterol must eat little fat Q. 18 To have a perfect body eat minimal fat Q. 20 People with high cholesterol must eat little salt Q. 18
Specific	Eat chicken instead of meat which has much fat Q. 19	Do not cook with lots of oils Q. 19

TABLE A.5f: Coding of answers of an interview (third series): Synopsis of recommendations about healthy diet

A.2.4 Schedule of the forth series of interviews

Preliminary questions:

Name

Age

Hobbies

Favourite lessons

Wants to become

Q. 1
Can you imagine somebody whom you think of being healthy? What do you see in him/her that makes you say that? Or what do you think makes people healthy?

Q. 2
What do you understand by health?

Q. 3
How important is it for you to keep healthy?

Q. 4
What should we do in order to be and keep healthy?

Q. 5
Are you doing any of those things?

Q. 6
What causes human diseases?

If habits are named, ask what diseases they may cause and how.

Q. 7
Which are the most common diseases?

Q. 8
Of what causes do most people die in this country?

Q. 9
Do you take extra care to protect yourself against those diseases or any other one?

Q. 10
Tell me about your likes and dislikes in food.

Q. 11
Which of the following sentence(s) describe your eating habits:

a. I eat whatever and whenever I want.

b. I just eat when I feel hungry.

c. It's a very important thing for me to enjoy what I eat.

d. I just eat and keep active.

e. I try to have a healthy diet but I don't always manage it.

f. I usually avoid some harmful foods and prefer some healthy ones.

g. My diet is always governed by rules of health.

Q. 12a *If sentences chosen in Q11 are from a to d only:*
Do you believe that there are such things as healthy or unhealthy diets?

Q. 13a
How are they?

Q. 14a
Why are they like this?

Then we move on to Q14.

Q. 12b. *If sentences chosen in Q11 include any from e to g:*
Can you describe to me what you think to be healthy eating?

Q. 13b
Why do you think that this is a healthy diet?

This question can be split into more specific ones like:

a. Why should we eat a lot of cereals, or

b. Why should we eat often, or

c. Why should we be vegetarians? *(If one supports that we should be vegetarians)*

Then we move on to Q. 14.

Q. 14
Can you describe to me any way or mechanism that diet affects health?

Q. 15
From where have you been informed about the relation between health and diet?

a. My family

b. Specialists through the media

c. School

d. Personal experience

e. Personal contact with doctors or trainers

f. Other

Probe about the specialists or the personal experience or the lesson of the school.

Q. 16
Which of the sources of information do you value most?

Q. 17
Here is a table taken from a World Health Organization report. *(The 'HEA plate' appears in section A.2.2.1.) Give it to the student and leave him/her to peer at it for some time*

Which are the food-related diseases?

Q. 18
How should our diet be in terms of foods in order to take those quantities of nutrients?

Q. 19
Here is the plate of healthy diet which is recommended by today's dietitians. What does this plate tell you?

Q. 20
Can you explain why the orange and the green sectors are larger than the others?

Q. 21
How do you compare your diet to these recommendations?

Q. 22
Is there anything in these recommendations you find hard to follow?

Q. 23
For which reasons you would not follow this diet, either partly or totally?

Q. 24
What do you expect the results from this type of diet to be for those people who follow these recommendations?

a. They will live longer

b. They will live less

c. They will enjoy their food more

d. They will enjoy their food less

e. It is less likely for them to develop some diseases

f. They will become more vulnerable to some diseases

g. They will perform better in their jobs and sports

h. They will perform worse in their jobs and sports

i. They will build nice bodies

j. They will lose their good bodylines

k. They will spend less on eating

l. They will spend more on eating

m. Other (please state)

Q. 25
Would you like to ask me anything?

	Limits for population average intakes	
	Lower	Upper
Total energy (in kcal)	2100	2800
Total fat (% total energy)	15	25
Saturated fatty acids (% total energy)	0	10
Unsaturated fatty acids (% total energy)	15	25
Dietary cholesterol (mg/day)	0	300
Total carbohydrate (% total energy)	55	75
Starch [b] (% total energy)	50	70
Dietary fibre (g/day)	27	40
Sugars (% total energy)	0	10
Protein (% total energy)	10	15
Salt (g/day)	0	6

TABLE A.6: The third 'WHO table' figuring population nutrient goals for the avoidance of diet-related diseases. It was used in the 4th and 5th series of interviews.

A.2.5 Schedule of the fifth series of interviews

Whatever is said in this interview is confidential. That means that although I will use the answers given to me, I will not mention any names of the interviewee or the school.

Any questions can be left unanswered.

PRELIMINARY QUESTIONS:

Name, gender

Age

Hobbies

Favourite lessons

Wants to become

Q. 1
How do you recognize a healthy person?

Q. 2
What do you understand by health?

Q. 3
How important is it for you to keep healthy?

Q. 4
What should we do in order to be and keep healthy?

Q. 5
Are you doing any of those things?

Q. 6
Which are the bodily diseases that most people suffer from?

Q. 7
Which are the diseases that kill most of the people in this country? I.e. the ones claiming the greatest number of victims?

Q. 8
Do you know what causes those diseases that you named in the previous two questions?

(Go through all the previously named diseases)

Q. 9
Do you take extra care to protect yourself against those diseases or any other one?

Q. 10
Tell me what foods you usually eat in the main meal of the day.

Q. 11
What do you usually take for breakfast?

Q. 12
Tell me about your likes and dislikes in foods.

Q. 13
Which of the following sentence(s) describe your eating habits:

a. I eat whatever and whenever I want.

b. I just eat when I feel hungry.

c. It's a very important thing for me to enjoy what I eat.

d. I just eat and keep active.

e. I try to have a healthy diet but I don't always manage it.

f. I usually avoid some harmful foods and prefer some healthy ones.

g. My diet is always governed by rules of health.

If sentences chosen in Q13 are from a to d only:

Q. 14a
Do you believe that there are such things as healthy or unhealthy diets?

Q. 15a
How are they?

Q. 16a
Why are they like that?

This question has to be adapted to the answer given in Q. 15a. Then we move on to Q. 16.

If sentences chosen in Q. 13 include any one from e to g:

Q. 14b
Can you describe to me what you think to be healthy eating?

Q. 15b
In what way do you believe that food or nutrient a or b *(depending on what the student has named in Q. 14b)* affects our health? *Then we move on to Q. 16.*

Q. 16
From where have you been informed about the relation between health and diet?

a. My family

b. Specialists through the media

c. School

d. Personal experience

e. Personal contact with doctors or trainers

f. Other

Probe about the specialists or the personal experience or the lessons of the school.

Q. 17
Which of the sources of information do you value most?

Q. 18
Here is a table taken from a World Health Organization report.

(The 'HEA plate' appears in section A.2.2.1.) Give it to the student and leave him/her to peer at it for some time. Which are the food-related diseases that this table refers to?

Q. 19
Which are the nutrients that we must eat most, which less and which ones we should avoid according to this table?

Q. 20
How should our diet be in terms of foods in order to take those quantities of nutrients?

Q. 21
Here is the plate of healthy diet which is recommended by today's dietitians. Do you recognize any obvious message(s) in it?

Q. 22
Can you explain why the orange and the green sectors are larger than the others? *(Take care that the interviewee refers to those sectors separately)*

Q. 23
How do you compare your diet to these recommendations?

Q. 24
Is there anything in these recommendations you find hard to follow?

Q. 25
Do you have any objections about this plate?

Only if the interviewee does not understand the question add:

i.e. do you believe that there are some wrong things or exaggerations written on it?

Q. 26
What difference (if any) do you believe that this type of diet will have on the lives of the people who will follow these recommendations?

a. They will live longer

b. They will live less

c. They will enjoy their food more

d. They will enjoy their food less

e. It is less likely for them to develop some diseases

f. They will become more vulnerable to some diseases

g. They will perform better in their jobs and sports

h. They will perform worse in their jobs and sports

i. They will build nice bodies

j. They will lose their bodylines

k. They will spend less on eating

l. They will spend more on eating

m. Other (please state)

Q. 27
Would you like to ask me anything?

Appendix no 3: THE STUDENTS' CRITICAL POSITION

A.3.1 Introduction

According to Krathwohl and Bloom (1959), the ability to evaluate **materials** is the most highly ranked objective among the different educational goals concerning the cognitive domain. On the other hand, the National Curriculum Council for England and Wales recommends the study of **sources of knowledge** in dietary matters as the ultimate topic in nutrition education (Section 1.6.2). There is obviously a connection between the educational materials and the sources of knowledge. The first proceed from the second. Someone who values certain sources of knowledge is expected to trust materials that express the principles and the product of those sources.

Coming to matters of diet, judgment about sources of knowledge is not expected to be a purely cognitive matter. Diet is above all a behaviour. Personal experiences, preferences, eating habits and values cannot but influence the positioning of a person against the principles and rules of a dietary paradigm. To what extent and in which manner is an issue to be dealt with by research.

This appendix looks at the data that reveal how the students of the present study judged the materials they were presented with (especially the 'HEA plate') and what they believed to be their own sources of information on matters of diet. The findings are discussed in the light of their expressed ideas and stated habits.

More specifically, the following questions will be answered:

1. How sound and practical do the students find educational materials such as the 'HEA plate'?
2. What sources of information do they listen to and which ones do they value?
3. To what extent do the above judgments depend on or interact with their eating practices and beliefs about diet?

The methods of analysis and the way of presentation of the findings are those followed in Chapter 4.

A.3.2 The 'HEA plate' as an educational material

A.3.2.1 Why should one eat like that?

The beliefs about the **general results** brought about by the diet prescribed in the 'WHO table' and the 'HEA plate' were investigated through closed type questions. So as not to predispose the students in favour of those materials, each putative positive result was followed by a negative one (see alongside). The great majority of students chose only positive results. Students' beliefs about this issue are presented analytically in table A.7. For the sake of simplicity only the statements that were chosen at least once are presented.

What do you expect the results from this type of diet (the students are presented with the 'WHO table' and the 'HEA plate') *to be for those people who follow these recommendations?*

a. They will live longer
b. They will live less
c. They will enjoy their food more
d. They will enjoy their food less
e. It is less likely for them to develop some diseases
f. They will become more vulnerable to some diseases
g. They will perform better in their jobs and sports
h. They will perform worse in their jobs and sports
i. They will build nice bodies
j. They will lose their good bodylines
k. They will spend less on eating
l. They will spend more on eating
m. Other (please state)

The most commonly expected result from the diet prescribed in the 'HEA plate' is that this type of diet diminishes the probability of developing certain diseases (93% of the sample). All the boys of the sample shared this view. One British boy, however, maintained that the opposite might also apply: although this diet might reduce the chances of developing certain diseases it might cause some other ones. Next, a widespread expectancy is that this diet contributes to better performance in sports and jobs (80% of the whole sample), and after that the expectancy for increased longevity (60% of the whole sample). These are the only expectancies shared by the majority of the sample. Some students pondered on the expectancy of increased longevity. Two of them would not relate a reduction in infirmity with increased longevity:

> "I don't think that they will live longer. They may live longer, but when an accident comes..." (G.08, Q.24)

"My objection is that there is not just one factor. In older times there was just one factor, that of diet, which decided whether they would live for long or not; but now there is the stress from society and there are too many factors and well..." (G.12, Q.24)

For some other students, though, this connection became obvious after some thought:

"I'm not sure about that one: 'They will live longer' ... Yes because there will be less diseases, they will live longer. That's it." (B.36, Q.26)

"Although this depends on other factors as well, but diet has a role to play." (G.04, Q.24)

All the other expectancies were shared by fewer than half of the students.

STATEMENT	GREEK (20)		BRITISH (20)		MALE (19)		FEMALE (21)		TOTAL (40)	
	N	%	N	%	N	%	N	%	N	%
They will live longer	10	50	14	70	11	58	13	62	24	60
They will enjoy their food more	7	35	9	45	9	47	7	33	16	40
Better performance in jobs & sports	15	75	17	85	16	84	16	76	32	80
Building nice bodies	10	50	4	20	7	37	7	33	14	35
Total good health	19	95	20	100	19	100	20	95	39	98
Unlikely to develop some diseases	18	90	19	95	19	100	18	86	37	93
More vulnerable to some diseases	0	0	1	5	1	5	0	0	1	3
They will enjoy their food less	0	0	1	5	1	5	0	0	1	3
Worse performance jobs & sports	1	5	0	0	1	5	0	0	1	3
Spending less for eating	0	0	1	5	1	5	0	0	1	3
Spending more for eating	0	0	2	10	1	5	1	5	2	5

TABLE A.7: Beliefs about the general results of the prescribed healthy diet: analysis with nationality and gender: numbers and percentages.

The only difference between subgroups that was found to be statistically significant referred to the attitude that a diet like the one illustrated on the 'plate' makes for nice bodies. It was supported by 50% of the Greek students compared to only 20% of the British ones (Pearson $x^2 = 3.956$, $p = 0.047$).

All the students except for one Greek girl chose at least one positive result, i.e. longevity, enjoyment, fitness or the building of nice bodies.

The expressed expectancies were correlated to the previously expressed specific beliefs about the physiology of foods and nutrients and to the students' understanding of health. It was found that students who had previously spoken about specific foods or nutrients which help to regulate body weight were more likely to accept that the 'HEA plate' helps in building a nice body, whereas those students who had said that the consumption of certain foods or nutrients aim at energy provision were not more likely to accept that the 'HEA plate' diet aims at better performance in jobs and sports (Crosstabulations A.8 & A.9).

Specific targets of perceived healthy diet: weight control	Results of 'HEA plate' diet: nice bodies		Total	Specific targets of perceived healthy diet: energy provision	Results of 'HEA plate' diet: good performance		Total
	Yes	No			Yes	No	
Yes	9	8	17	Yes	7	2	9
No	5	18	23	No	25	6	31
Total	14	26	40	Total	32	8	40
Pearson chi-square: 4.183 Significance: 0.041				Pearson chi-square: 0.036 Significance: 0.850			

CROSSTABULATIONS A.8 & A.9: Specific targets of healthy diet * Results of the 'HEA plate' diet. Numbers represent students.

The students who had included the component of good looks while defining health were slightly more likely to associate the 'HEA plate' with an expectancy of nice bodybuilding. Similar positive correlation was not found, however, in the fitness domain (crosstabulations A.10 & A.11).

Appearances of health: good looks	Results of the 'HEA plate': nice bodies		Total	Health definition: fitness	Results of the 'HEA plate': good performance		Total
	Yes	No			Yes	No	
Yes	10	14	24	Yes	9	2	11
No	4	12	16	No	23	6	29
Total	14	26	40	Total	32	8	40
Pearson chi-square: 1.172 Significance: 0.279				Pearson chi-square: 0.031 Significance: 0.859			

CROSSTABULATIONS A.10 & A.11: Understanding of health * Results of the 'HEA plate' diet. Numbers represent students.

A.3.2.2 Comments on the 'HEA plate'

For which reasons you would not follow this diet, either partly or totally (Series 4)? *Do you have any objections about this plate* (Series 5)?

For 25 students the 'plate' was "O.K.". More females said this than males (71% vs 53%) and more British than Greeks (70% vs 55%). These were not statistically significant differences. One English girl was very eloquent in explaining why she found materials like the 'HEA plate' to be proper educational material for subjects of her age:

> - I find it difficult to know (what) a balanced diet is. I mean you hear very often you should have a balanced diet, but I mean what is a balanced diet anyway? You know... I don't really know properly what foods to eat. I just think what I think it's healthy rather than what might be good for me. So...
>
> - *Could information like this or this one (showing the 'table' and the 'plate') be a clue for you, for this question?*
>
> - Yes it is a bit clue but it is hard to look at the figures and then say 'of what food is that then'...
>
> - *Is this more proper, more easy? (showing the 'plate')*
>
> - Yes more easy to follow because it is related to food more easily, where this is just figures, you just look at it and you think 'where can I find 20% of unsaturated fats in?' You don't really look at that on the food label. It's stupid but when I'm buying food for myself I look at the picture on there. Cover rather than percentage of (...)
>
> - *So this looks more pertinent for you.*
>
> - Definitely yes. Not for me, maybe for my age group I don't know but, I find that more easy to follow (B.37, Q24).

In the above-cited dialogue, a misinterpretation of the 'WHO table' was revealed. This student seems to believe that the percentages of nutrients, which normally represent population nutrient goals, are the recommended composition of every food consumed.

Fifteen students (38%) expressed some kind of reservation. Four students had **general reservations**. Three of them said that it is not a good idea to prescribe what people must eat. The most eloquent opposition to the idea of the 'plate' came from a Greek girl:

> "First of all I don't think that diet is beneficial and you will live longer. If you are destined to die, you will die whatever you may eat. Perhaps this is not correct, but I see no reason why I should eat vegetables all the time just for living 10 years more. All those years of deprivation, why? Well I will tell you that this is correct, they will live more years. That's what we hear from TV, but for me, I don't believe it and I don't believe that it is the right thing to do to live this life in order to live 10 years more. I mean to do without sweets ... what for? To live longer. Why?" (G.09, Q.24)

The poor taste of the foods in the 'plate' was mentioned by another student:

> "No, about the taste only. Forbidden things are more palatable." (G.10, Q. 23)

As for the **specific foods contained** in the 'plate' there were 11 'dissidents'.

The dairy foods sector generated the greater number of disagreements, but not for the same reasons though. For 3 Greek and 1 British students this sector was too small. One of them said:

> "... about milk. Milk... well to be honest I have recently heard many things according to which too much milk is damaging. I've heard from a broadcast that those who drink a lot of milk from a young age develop problems. A lot of milk is problematic. I believe that milk is needed for bones. For bones it's basic, especially in growth. We see that all those dealing with healthy eating, and especially for children, believe that milk is a basic prerequisite and they try to improve it for children's sake. So it is a basic factor." (G.06, Q.19)

One British girl expressed her concern about the fat content of cheese:

> "Cheese, because it comes with fat, because they have quite a high percentage of fat. So cheese should also be in that one (*pointing to the smallest sector of the 'plate'*) as well." (B.27, Q.24)

Three Greek girls expressed their reservations about eating enough bread, which they considered as a fattening food. One of them said that, besides being fattening, bread "dilutes" the taste of the other foods:

> "... when you eat bread with salad, salad loses its substance, it's not the same taste when you eat it on its own and when you eat it with bread. Everything is lost, when you eat greens with bread as Greeks do, this isn't the same. Without bread they taste differently. And I believe that bread can be substituted by other things. Because bread makes Greeks big.
>
> *-What could substitute for bread?*
>
> -Potatoes.
>
> *-That makes no essential difference.*
>
> -Yes but eating boiled potatoes is quite different from eating bread.
>
> *-Is it more palatable?*
>
> -I don't know if it is more or less palatable, what I know is that you will put on much more weight with the bread. And I believe that potato is more filling. And you will have taken the same nutrients." (G.09, Q.23)

One British boy expressed his disagreement with the dimensions of the 'meat and alternatives' sector and his concern about the junk food depicted in the 'plate':

> "I'd say this should be a bit bigger ...
>
> *-Bigger?*
>
> -Yes, the pink one. And the yellow should be a bit smaller. That's about it.
>
> *-Can you give a special reason for the pink one?*
>
> -Yes you need more proteins, more meat to build yourself of higher proteins, to be more healthy and stronger and less junk foods because they cause ... they are harmful for your body." (B.30, Q.25)

Another British boy of Vietnamese origin questioned the lack of alternative foods in the 'plate':

> "... on there, the choice of food I don't think is wide enough. For example there are certain things that are missing and ...
>
> *-There are things that are missing ...*

-Yes I reckon, you know sir, there are alternative things like vegetarian meat, I don't ... I've forgotten the name of it. You know what I mean, like soya. Soya can provide quite a lot, it can provide fat, protein, O.K., it has a minimum amount of fibre, so there is alternative food which can still give you this kind of balance of you know this recommended balance of good health ..." (B.35, Q.24)

A misinformed Greek boy expressed his concern about the possible preservatives that come with tins:

"Er ... I see here some tinned peaches which will, of course, contain some preservatives in order to be preserved. I think I must not agree with that, it's better to avoid them totally instead of using them." (G.18, Q.23)

Finally, a British boy was worried about the virtual exclusion of sugar in the 'plate':

"This plate seems like a very good pamphlet and containing good information (...) yes if you follow this diet you're bound to remain healthy, I can't see any problems with this ... except for maybe ... yes the sugar it doesn't tell you actually to have an out, of course the sugar should be a natural thing, yes that's pretty reasonable.

-Well it speaks about sweets here...

-Yes fats and sugary foods.

-And as you see the sector is the smallest one.

-That's right once again sugar doesn't really play an important role, would it? As far as I ... I believe it's to help absorb materials, to help absorb other nutrients, I' m not too sure yet, I don't know ..." (B.25, Q.25)

A.3.2.3 Acceptance of the 'HEA plate' and profile of beliefs and diet

The **profiles** of the students who agreed with the 'HEA plate' and of those who expressed some kind of reservation were slightly different as far as their beliefs about diet are concerned. Those who agreed with the 'HEA plate' appeared to entertain more beliefs about the characteristics of healthy diet, expressed more correct beliefs about the physiology of foods and nutrients and had a higher ratio of correct over total beliefs compared to the second group. There was no difference, however, in their level of knowledge about the composition of foods and in their (self-reported) commitment to a healthy diet. For this examination the variables introduced in Sections 5.4 and 7.4 were used. The results are presented in table A.12. None of the recorded differences were statistically significant. In other words, acceptance of the 'HEA plate' can be marginally predicted from the accuracy and the depth of the beliefs that students have about a healthy diet but not from their knowledge about foods' chemistry or their eating practices.

VARIABLE EXAMINED	MEAN VALUE OF THE VARIABLES FOR THE STUDENTS WHO EXPRESSED: AGREEMENT (N=25)	RESERVATIONS (N=15)	MANN-WHITNEY U & SIGNIFICANCE
Depth of knowledge about the composition of foods	4.28	4.27	U = 186.5 p = 0.98
Accuracy of knowledge about the composition of foods	0.90	0.87	U = 163.5 p = 0.42
Depth of beliefs	5.04	4.20	U = 143 p = 0.21
Total specific beliefs about the physiology of healthy diet	2.28	2.00	U = 151 p = 0.30
Accuracy of beliefs about the nature and the physiology of healthy diet	0.84	0.73	U = 142 p = 0.19
Perceived commitment to healthy diet	3.66	3.53	U = 186 p = 0.97

TABLE A.12: Mean values of variables expressing knowledge, beliefs and dietary habits for students agreeing and expressing reservations for the 'HEA plate'

A.3.3 The 'HEA plate' with personal reference

A.3.3.1 Comparisons with own diet

How do you compare your diet to these recommendations?

To the question of how the students compared their diet to the 'HEA plate', 4 students (3 Greek, 3 male) characterized it as identical, 10 students (5 British, 6 male) characterized it as similar and 5 students (3 British, 3 female) characterized it as very different. The rest of the students did not give an overall comparison.

The particular comparisons between the personal diets of the respondents and the diet recommended on the 'plate' are shown in table A.13. It is obvious that the students mentioned only some of the sectors of the 'plate'. Some of the sectors were mentioned by less than half of the sample. The three sectors with the smallest dimensions, i.e., the protein, the dairy and the fatty and sugary sectors, were the least mentioned ones.

Sixty eight per cent of the students mentioned the green sector, most of them saying that they either eat fewer fruits or vegetables than are recommended or avoid them. Next, the starchy sector was compared to their own diet by 25 students of whom 21 said that they eat either the recommended proportions or even more than these. The percentage of students who reported eating larger than recommended proportions from "meat and alternatives", "dairy" and "fatty and sugary foods" ranged between 20 and 25%.

FOOD GROUPS	NUMBERS AND PERCENTAGES OF THE STUDENTS WHO:									
	Do not eat		Eat less		Eat what is recommended		Eat more		Did not mention	
	N	%	N	%	N	%	N	%	N	%
Fruits	1	3	8	20	12	30	1	3	18	45
Vegetables	3	8	13	33	8	20	1	3	15	38
Fruits & vegetables	2	5	15	38	9	23	2	5	12	30
Starchy	0	0	4	10	18	45	3	8	15	38
Meat & alternatives	0	0	3	8	7	18	9	23	21	53
Dairy	0	0	7	18	3	8	8	20	22	56
Fatty & sugary	0	0	6	15	5	13	10	25	19	48

TABLE A.13: How students compare their own diets to the 'HEA plate'

A.3.3.2 Personal preferences and the 'HEA plate'

In the question about the ease of application of the 'plate', 13 students (33%) said that they found no difficulty with it. The rest of them found difficulties of different sorts.

Is there anything in these recommendations you find hard to follow?

Many students expressed difficulties with particular foods. So, 13 students (9 Greek, 8 female) reported that the green sector contains foods that are difficult to swallow. Vegetables were the foods most often mentioned as being difficult to swallow, while fruits were mentioned by only one British girl. No student reported having difficulties with the starchy sector. Four students, all of them female, said that they had difficulties with the pink sector. Two of them were Greeks who said they disliked legumes, and 2 were British who said that they didn't like meat and fish. Three students said that they could not get used to eating the suggested quantity of **dairy** foods.

> "I believe that it's difficult to follow those two categories because sometimes like here in school when you've got nothing to eat and you want to fill your stomach ... eh … you will get some milk to drink although you've already drunk it in the morning and when you go back home, you'll drink again ..." (G.12, Q.22)

A British girl, though, said that she just could not eat so much dairy produce:

> "I don't know why I don't eat a lot of milk; I just don't, and I try to eat yogurt, I only have it like once, maybe twice, a week, er ... I think I need to concentrate on my dairy products because I don't have a lot.
>
> *-Why you don't eat so many of those?*
>
> -No, my doctor is saying to me, you know, because you get a lot of calcium from the dairy products and I don't have a lot, that's why ... I should know I'm lack of calcium in me, but still I don't have it, I don't know why (...)
>
> *-Right, it's not a matter of taste?*
>
> -It's not a matter of taste, I could have yogurt say instead of packet of crisps, I prefer the packet of crisps though instead of the yogurt, sorry. On the other hand then ... cheese, I like cheese but just don't think anything to offer me really." (B.28, Q.24)

Ten students said they had difficulties in controlling the amount they ate from the yellow sector. Six of them (3 British, 3 female) could not cut down on sweets. Two said that they could not reduce the amount of fat in their diet and two others said that they could not cut down on refreshments.

Three students said that they found some **practical difficulties** in applying the 'HEA plate', which were the time needed to prepare this type of food as compared with ready-to-eat food and the fact that this food is more expensive:

> "So, like the brown bread, as far as I know, brown bread is very expensive in this country. It is not very expensive but compared with white bread it is and obviously, you know, the brown bread is more expensive, so sometimes you have to limit yourself to what you can eat and this could be a problem" (B.25, Q.24)

The same Vietnamese student who found alternative foods to be missing from the 'plate' (Section A.3.2.2) said that he found difficulties in accommodating his diet to foods shown in the 'HEA plate'.

Two British girls expressed the attitude that although there is no problem eating "like the plate" when they are at **home**, it is difficult to follow this kind of diet when they are at **school**:

> "I mean the other sector, where is bread and cereals and vegetables they are foods that I eat mostly at home ... I mean those are these that I take at home. But sugary and fatty foods are those that I take a lot during the day when I' m at college." (B.33, Q.23)
>
> "Because at home we do eat a lot of bread and we eat pasta and potatoes and vegetables as well because some nights we have something like pasta, the other nights we have something like cooked vegetable or chicken or something like that and we'll have fish as well and vegetables that is how it is ... because when I'm at college I won't eat breakfast in the morning because I leave early and at break, at lunch time would have a cheese burger with crisps, I like it, that's my favourite. But at home that's how the foods are cooked, that's how my diet is at college, (laughs) that's how my diet is at home." (B.34, Q.23)

A.3.3.3 Practical reception of the 'HEA plate' and beliefs

How do the students' practices reflect their opinions about the 'plate'? First of all it appears that some of their eating practices have to do with their reservations. So, three of the four students who expressed the attitude that the dairy sector is rather small reported eating greater quantities of dairy foods than those recommended. Also, two of the three girls who said that they believe that bread is fattening declared that they eat less from the starchy sector. However, the students who said that they agree with the overall message of the 'plate' were not more likely to have adopted similar eating practices (crosstabulation A.14). In table A.15 the mean measures of performance of mental processes (Section 6.4) of the group that reported eating accordingly from the 'HEA plate' are compared to the respective means of the group that reported eating differently to the 'HEA plate'. Comparisons are also made between the characterization of students' diet in comparison with the 'plate' and (a) the measures describing their level of beliefs about the physiology of diet (Section 5.4) and (b) their perceived commitment to a healthy diet (Section 7.4).

COMPARING OWN DIET WITH THE 'HEA PLATE'	POSITION ABOUT THE 'HEA PLATE'		TOTAL
	Agreement	Reservations	
Similar	9	6	15
Different	16	9	25
TOTAL	25	15	40
Pearson chi-square = 0.064, significance = 0.800			

CROSSTABULATION A.14: Diet comparison with the 'HEA plate' * Position about the 'HEA plate'. Numbers represent students

VARIABLE EXAMINED	MEAN VALUE FOR STUDENTS WHO DESCRIBED THEIR DIET IN COMPARISON WITH THE 'HEA PLATE' AS: SIMILAR (N=15)	DIFFERENT (N=25)	MANN-WHITNEY U & SIGNIFICANCE
Depth of food recommendations	3.80	4.12	U = 171, p = 0.64
Accuracy of food recommendations	0.76	0.67	U = 146, p = 0.24
Comprehensiveness of food recommendations	2.53	2.60	U = 183.5, p = 0.91
Depth of beliefs about the physiology of healthy diet	5.40	4.32	U = 151, p = 0.30
Accuracy of beliefs about the nature and the physiology of healthy diet	0.71	0.85	U = 105.5, p = 0.02*
Perceived commitment to healthy diet	3.90	3.44	U = 143.5, p = 0.20

TABLE A.15: Mean values of variables expressing knowledge, beliefs and dietary habits for students who said that feed similarly to and differently from the 'HEA plate'. (*) Significance < 0.05

A.3.4 Sources of information

A.3.4.1 Actual and valued sources

From where have you been informed about the relation between health and diet?
a. My family
b. Specialists through the media
c. School
d. Personal experience
e. Personal contact with doctors or trainers
f. Other

The more commonly mentioned sources of information were family by 29 students, media by 23 students and school and personal contact with doctor or trainer by 20 students each. Media and family are more influential among Greek students than among their British counterparts. British students on the other hand appear to be mainly influenced by school. The results are summarized in table A.16.

The most commonly valued source appeared to be the "personal contact with doctors or trainers": 11 Greek and 5 British students chose it, with two Greeks among them saying that valued the contact of their own trainers. A Greek student said that he valued his own experience and a Vietnamese-British student did not name any of these sources as valued. On average, the number of valued sources of information for each student was smaller than the number of actual sources of information. That means that students recognize that their actual sources of information are not all of them reliable. 'School' and 'personal contact with doctors or trainers' appear to have the greatest perveived reliability among the sources: 9 out of 20 students (mainly British girls) who recognize their influence, also value them.

As for what constitutes personal experience leading to knowledge about healthy diet, here are some ideas expressed by the students.

> "When I don't eat the right fruits, I feel something is missing from me. Milk, sometimes I feel I am missing milk. It's something that I feel; it comes from the constitution. Ah ... I have been accustomed to some kinds of foods and when I haven't those that I deem as basic ones I feel something is missing." (G.6, Q.15)
>
> "... my sister for instance, who is very skinny, I saw that for some time she stopped taking ... she did not want to eat very much, she lost her appetite and I saw that this affected her, she lost a good deal of weight, and the result is that she now has headaches and different problems." (G.14, Q.15)
>
> "Er ... Many times I did not feel well. For instance I could not sleep in the night because of bad diet, from too much eating ... Generally it happened that I ate badly for a month and put on up to 5 kilos. I didn't like that and then I struggled to lose this and this showed in the training. It showed in my exercise." (G.16, Q.15)
>
> "Well, I know it's obvious to me when I eat something unhealthy because it doesn't usually digest properly and feels heavy in my stomach for a long time afterwards and that can't be regular for you I assume."
>
> *-And what types of foods are hard for you to digest?*
>
> -Meat, fried foods." (B.32, Q.16)

SOURCES OF INFORMATION		GREEK (N = 20)		BRITISH (N = 20)		MALE (N = 19)		FEMALE (N = 21)		TOTAL (N = 40)	
		N	%	N	%	N	%	N	%	N	%
	a	18	90	11	55	15	79	14	67	29	73
Family	v	2	10	7	35	7	37	2	10	9	23
	A & v	2	10	7	35	7	37	2	10	9	23
	a	16	80	7	35	10	53	13	62	23	58
Media	v	5	25	1	5	3	16	3	14	6	15
	a & v	4	20	1	5	2	11	3	14	5	13
	a	6	30	14	70	9	47	11	52	20	50
School	v	3	15	8	40	1	5	10	48	11	28
	a & v	1	5	8	40	1	5	8	38	9	23
	a	8	40	4	20	4	21	8	38	12	30
Doctors	v	8	40	2	10	4	21	6	29	10	25
	a & v	3	15	0	0	0	0	3	14	3	8
	a	12	60	0	0	5	26	7	33	12	30
Dietitians	v	2	10	0	0	2	11	0	0	2	5
	a & v	1	5	0	0	1	5	0	0	1	3
	a	11	55	9	45	11	58	9	43	20	50
Personal contact	v	11	55	5	25	9	47	7	33	16	40
	a & v	6	30	3	15	5	26	4	19	9	23
	a	1	5	1	5	1	5	1	5	2	5
Trainers	v	2	10	1	5	2	11	1	5	3	8
	a & v	1	5	1	5	1	5	1	5	2	5
	a	4	20	4	20	3	16	5	24	8	20
Personal experience	v	1	5	0	0	1	5	0	0	1	3
	a & v	1	5	0	0	1	5	0	0	1	3
	a	1	5	0	0	0	0	1	5	1	3
Personal reading	v	0	0	0	0	0	0	0	0	0	0
	a & v	0	0	0	0	0	0	0	0	0	0
	a	1	5	1	5	2	11	0	0	2	5
Friends	v	0	0	1	5	1	5	0	0	1	3
	a & v	0	0	1	5	1	5	0	0	1	3

TABLE A.16: Sources of information. Numbers of students and percentages. (a) = actual, (v) = valued.

In order to have an insight into the nature of the sources of information that students believe they are affected by and value, the different sources described in table A.16 were grouped in three major groups: (1) professional sources including doctors, dietitians, and personal contact with doctors; (2) semi-professional sources, including school, media, and trainers; (3) lay sources including family, personal experience and other. The results are given in table A.17.

SOURCES OF INFORMATION	GREEK (N = 20		BRITISH (N = 20)		MALE (N = 19)		FEMALE (N = 21)		TOTAL (N = 40)	
	N	%	N	%	N	%	N	%	N	%
a	15	75	4	20	8	42	11	52	19	48
Professionals v	18	90	7	35	13	68	12	57	25	63
a & v	14	70	2	10	8	42	8	38	16	40
a	20	100	19	95	18	95	21	100	39	98
Semi-professionals v	9	45	9	45	5	26	13	62	18	45
a & v	9	45	9	45	5	26	13	62	18	45
a	20	100	13	65	16	84	17	81	33	83
Lay people v	2	10	8	40	8	42	2	10	10	25
a & v	2	10	8	40	8	42	2	10	10	25

TABLE A.17: Actual, valued and simultaneously actual and valued grouped sources of information. Numbers of students and percentages. (a) = actual, (v) = valued.

According to this categorization, the most influential source of information for the students are semi-professionals (98%) and then lay people (83%). The most valued information, though, comes from professionals (63%). All the students who value the information coming from semi-professionals and lay people said that they are also influenced by these sources of information. Of the 25 students who value the information coming from professionals, 16 said that they are influenced by it and 9 that they are not.

Table A.17 also reveals that Greek students believe that part of their knowledge comes from what professionals have to say and appreciate this knowledge to a greater degree than British students. (For actual sources, Pearson chi squared = 12.1, $p < 0.001$. For valued sources, Pearson chi squared = 12.9, $p < 0.001$). Semi-professional knowledge is valued by the majority of girls but by fewer boys. (Pearson chi squared = 5.1, $p = 0.024$). Finally, knowledge from lay people is made use of to a greater extent by Greeks than by British students but is appreciated more by English students and boys. (For actual knowledge, Pearson chi squared = 8.49, $p = 0.004$. For valued knowledge between nationalities, Pearson chi squared = 4.80, $p = 0.028$; between genders, Pearson chi squared = 5.65, $p = 0.017$).

The prevailing student profile regarding influence and reliability of sources of information was the one that recognized influence from all three groups of sources but valued mainly the professionals' view. This profile was shared by 15 students (14 Greeks). The second most common profile was the one that recognized influence mainly by semi-professionals and lay people and valued information from either one or both of these sources. It was shared by 10 students (9 British).

A.3.4.2 Measures of performance and associations

In order to portray the degree to which students valued and used professional sources of information, two new variables were developed. The values of these variables were calculated as follows. If a student had selected professional sources of information s/he was given the value 3, for semi-professional sources the value 2 and for lay sources the value 1. If a student had selected sources from more than one group s/he was given the average of the above-mentioned values. The means for these values for the whole sample and for the different sub-groups are given in table A.18.

MEAN VALUES OF THE NATURE OF ACTUAL AND VALUED SOURCES OF INFORMATION FOR THE DIFFERENT GROUPS AND FOR WHOLE SAMPLE			Mann-Whitney U	Significance
Actual	Greek students = 1.88	British students = 1.75	155	0.16
Valued	Greek students = 2.68	British students = 1.98	93	0.002
Actual	Male students = 1.76	Female students = 1.86	166.5	0.30
Valued	Male students = 2.21	Female students = 2.43	180	0.58
Actual	Reporting similar diet to the 'HEA plate' (N=15) = 1.83	Reporting different diet to the 'HEA plate' (N=25) = 1.80	177.5	0.75
Valued	Reporting similar diet to the 'HEA plate' (N=15) = 2.33	Reporting different diet to the 'HEA plate' (N=25) = 2.32	181.5	0.86
Actual Valued	Whole sample (N=40) = 1.81 Whole sample (N=40) = 2.33		Wilcoxon signed ranks test Z = 4.37	< 0.001

TABLE A.18: Mean values of variables expressing the kind of actual and valued sources of information. Values range between 1 and 3. Higher values refer to professional sources, lower to lay sources.

In order to find out whether the source of information had any effect on the eating practices or the beliefs of the students, several correlations were carried out between the variables that described the nature of the sources of information, the variables that described the reported commitment to a healthy diet, those that described the beliefs of the students about what is healthy eating and those that described the level of mental processes of the students on this matter. So, the actual and the valued sources of information were successively correlated with: (1) the depth of beliefs, (2) the accuracy of beliefs, (3) the comprehensiveness of beliefs, (4) the total specific beliefs, (5) the depth of knowledge, (6) the accuracy of knowledge, (7) the comprehensiveness of knowledge (variables described in Section 5.4), (8) the depth of food recommendations, (9) the accuracy of food recommendations, (10) the depth of reasoning (variables described in Section 6.4), (11) the comprehensiveness of hobbies, (12) the depth of precautions and (13) the diet profile variable which described the perceived commitment to a healthy diet (variables described in Section 7.4). The correlations that were found significant are shown in table A.19.

	Actual sources of information	Valued sources of information	Perceived commitment to healthy diet
Actual sources of information	1		
Valued sources of information	0.639**	1	
Perceived commitment to healthy diet	0.307*	0.107	1

TABLE A.19: Correlation coefficients (Spearman's rho) between sources of information and perceived commitment to healthy diet. (High values of sources of information mean more professional sources.)
*** Correlation is almost significant at 0.054 level**
**** Correlation is significant at 0.001 level**

A.3.5 Discussion

A.3.5.1 The role of the 'HEA plate'

A.3.5.1.1 An exemplary diet promotes good health and prevents illness

The statistics in table A.7 show that the large majority of the students acknowledge that the diet suggested in the 'HEA plate' both promotes positive health and prevents illness. This two-fold benefit from a healthy diet was not declared when the students voiced their own ideas about healthy eating. As found earlier (Section 5.2.4), 73% of the students acknowledged good health as the objective from consuming certain foods or nutrients (crosstabulation 17). Similarly, 60% of them had then referred to the role of diet as a deterrent to illness (crosstabulation 18). The increase in the percentages of students that declared a two-fold benefit from diet at this stage of the interviews can be attributed to two possible reasons:

- to the fact that the students recognized that the 'HEA plate' is a complete diet, proposed by experts, whereas their own suggestions were incomplete and not well prepared.
- to the fact that the question about beliefs was open, whereas the question about the outcomes of the diet depicted in the 'plate' was a multiple choice one. Choosing from a list is easier and generates more answers.

It is, however, positive that so many students recognize the contribution of a healthy diet to both aspects of health albeit that such recognition is voiced only after they are asked by means of such research tools.

All 3 students who did not recognize the illness-preventing role of the diet of the 'plate' were girls. One of them, after having defined health both positively and negatively, said that for her bodily health was quite insignificant and that a healthy diet mainly aims at weight control and helps somebody not to feel heavy. Here are some extracts of her sayings:

> The maintenance of my health with the meaning of (absence of) illness, I would say that is not so important, because it is minor, but psychological health is very important. (G.09, Q.3)

> For my bodily health I do quite the opposite. Generally I don't take care to protect myself from cold and such things. Quite the reverse things. (G.09, Q.5)
>
> I believe that there are diseases caused by old age, which cannot be avoided. (G.09, Q.6)
>
> If you are destined to die, you will die whatever you may eat. (G.09, Q.24).

The second girl, an ex-athlete, identified health with healthy behaviour:

> "When you exercise, when you eat correctly, that is health, when you do nothing to harm yourself." (G.15, Q.2)

The same girl also failed to pinpoint any specific physiological effect that diet may have on health other than obesity, but she believed that those who eat from the 'plate' would live longer.

The third girl also identified health with what is generally thought of as healthy behaviour. The fact that she did not pick up the statement that a balanced diet prevents some diseases can be attributed to a mistake on her part because at an earlier stage of the interview she appeared to be aware of the role that immoderate fat consumption might play in deteriorating the condition of the circulatory system.

So, a probable explanation for the fact that the first two girls denied the benefit that a balanced diet may have on the avoidance of diseases, lies in their perception of health: mainly psychological and having to do with body image for case G.09, mainly physical fitness for case G.15. Avoidance of bodily ill-health does not appear as a main priority for any of them. Additionally, for cases G.09 and G.15 this failure can be attributed to either lack of information about nutrient physiology, or to selective perception of the relevant information (see Section 2.2.2).

The cases discussed here were not the only ones that expressed a mainly positive attitude about health; the first two students, however, combined this attitude with ignorance of the preventive role of balanced diet, a relationship that may not be coincidental. These cases may in fact be the tip of the iceberg: some students are not convinced of the necessity or feasibility of preventing ill-health.

The only student who did not identify any positive result from following the diet recommended by the 'HEA plate' may lack relevant information. Although she was a girl with a wide perception of health, her expressed knowledge about the physiology of food referred to growth and prevention of illness only.

Crosstabulations A.8 – A.11 show that students' perceptions of health are not predictors of the way that they will approach materials like the 'HEA plate'. Their knowledge about the foods and nutrients that contribute to or prevent obesity may be better predictors. This is in accordance with one of the conclusions of Chapter 6, where it was suggested that care for weight is a pivotal concept which shapes the students' mental processes about the effects of diet.

A.3.5.1.2 The reception of the 'HEA plate'

For the majority of the students in the present study the **necessity** or the **advisability** of the 'plate' were obvious (Sections A.3.2.1 and A.3.2.2). The general reservations expressed by 4 students duplicate to some extent Contento's (1980) ideas about the limits of the 'food-specific approach' (Section 1.4.1), namely the danger of advise being mistaken as manipulation and the cultural assumptions that may lead to conflicts. On the other hand, case B.37 (citation in Section A.3.2.2) was assertive in her praise of such educational materials. This contrast in students' evaluations should not be surprising. Every student has his/her own ability to grasp messages, and is especially predisposed against any kind of recommendations concerning life-style. Nor is it the case that the acceptance of such materials can be predicted from the students' level of knowledge, beliefs or habits (table A.12).

As for case G.09, her objection about materials like the 'HEA plate' is consistent. For a series of reasons she could not but reject the idea of 'healthy eating suggestions'. Among these reasons one could enumerate her perception about health (see Section 4.2.1), a sense of fatality that she has developed about illness (see citation in Section A.3.2.2) and the high value she puts in the enjoyment from food, a value that she thinks irreconcilable with balanced diet (see discussion in 7.5.4.2). In fact, among the subjects of the present study this case is the only one that is consistent in her reasons for rejecting the idea of the 'HEA plate'. These ideas, which might not be as rare as the statistics in the present study suggest, is a real challenge for nutrition education and for health education generally. Tackling matters of balanced diet should not be unrelated to the meaning of health and to the facts about ill-health, as suggested in Section 4.5.

Some of the reservations regarding the **content** of the 'plate' echoed controversial beliefs expressed in previous stages of the interviews, namely the fear by the Greeks of the fattening effect of bread and the British preference for protein (Section 6.2.3). Some Greek students, on the other hand, appear to have a strong preference for milk. The crucial role that milk plays in growth, in addition to the fact that the subjects of this study are still in the stage of growth, may have been a reason for this preference. The controversial belief expressed by a Greek student that tinned foods contain preservatives calls for the inclusion of some basic instruction on food technology in the Greek syllabus, which for the time being is missing. The belief that sugar may help in the absorption of other nutrients has not previously been reported. The fact that two British students criticized the 'plate' for its large content of fat, shows the adverse effect that the insistence on some nutrients only may have on the beliefs of instructed people.

The reservations concerning the content of the 'plate' can therefore be categorized in two groups. First, reservations that can be attributed to lack of information and, secondly, those that constitute exaggerations of proper messages of nutrition. It looks then that moderation should not only characterize healthy diet but instruction about healthy diet as well. Prohibiting nutrients may finally lead to an unbalanced picture of a 'healthy diet'.

A.3.5.2 The 'HEA plate' in practice

A.3.5.2.1 With reference to personal diet

When comparing their own diet with that of the 'plate' the students focused mainly on the 'fruits and vegetables' sector and to a lesser degree on the 'starchy' sector (table A.13). Most of the students referred to the green sector to say that they usually eat less than the recommended quantities. On the other hand, 84% of those students who mentioned the starchy sector said that eat either the recommended quantities or even more. Only half of the students made comparisons between their own diets and the diet recommended in the 'plate' as far as meat and alternatives, dairy, fatty and sugary foods are concerned.

These findings show the usefulness and the limits of the 'HEA plate'. It has managed to make some students think and speak about foods that they usually overlook, namely fruits and vegetables (see Sections 6.5.3.1 and 7.5.3). However, the food groups that are represented by small sectors on the 'plate', i.e. meat and alternatives, dairy and fatty and sugary foods, slipped unremarked from half of the students! In other words, the 'plate', perhaps due to its configuration, appears more eloquent in making suggestions for generous rather than moderate intakes.

The consequence for nutrition education is that a teacher needs to ensure that even the small sectors of the 'plate' stir up discussion in the classroom, so that it is made clear to the students that moderation does not mean insignificance and that protein, dairy and fatty foods are absolutely necessary in some limited quantities.

The four students who declared that they eat less starchy food than is recommended were female and three of them were Greeks. This fact echoes the attitude that starchy foods must be taken in moderation, expressed in the interpretation of the 'WHO table' (see Section 6.2.3, table 29). This attitude was expressed mainly by Greeks and females. In fact, two of the Greek girls who said that they eat starchy foods in moderation had previously expressed the relevant belief. A similar coincidence between beliefs and eating practices was found with regard to the meat and alternatives intakes. Seven out of the nine students that admitted eating greater quantities of meat and alternatives than the ones recommended in the 'plate' had previously said that we can eat as much meat as we like. In particular the four British students of this group proposed that we must eat much protein.

The ways that the students compared their own eating practices with those recommended on the 'plate' echo in many ways their preferences and dislikes of specific foods. So, fruits and vegetable, for instance, are both disliked and avoided by many students; starchy foods are not disliked by any student and are avoided by quite a few students; four girls abhor protein foods and especially meat, which constitutes a notable difference between the two genders. Another obvious analogy exists between the numbers of students who said that they find it difficult to eat few sweets and those who said that they usually eat more sweets than those suggested in the 'plate'. So the analogies observed between likes/dislikes and much eating/less eating across the different sectors of the 'HEA plate' have a general corroborative meaning and must be seen as common practices of young people.

In Section 6.5.2 it was stated that the 'WHO table' did not manage to provoke conceptual change to most of the students who maintain controversial beliefs about starch and protein. From the number of students that spotted the inconsistency between their diet and the figure in front of them, it appears that materials like the 'HEA plate' can more successfully play this role, provided that these are used properly.

The hypothesis that the students who believe that they eat similarly to the diet of the 'HEA plate' would be more likely to express an overall agreement with its message was not confirmed (crosstabulation A.14). Table A.15 is one more indication that there is no connection between eating practices and knowledge and beliefs about food as they are represented on the 'HEA plate'. One might come to the conclusion that eating practices for most of the students are more an affective matter than a cognitive one. The only overall difference between the two groups who profess eating similarly to and differently from the 'HEA plate' is that the second group appear less fluent (expressed fewer beliefs) but more precise (greater percentage of correct beliefs) from the first one. In the same table we have an indication that a professed commitment to healthy diet is not associated with eating practices fitting in with the 'HEA plate'.

A.3.5.2.2 With reference to its practicality

The findings presented in Section A.3.3.2 reveal that for the majority of the students the 'HEA plate' recommends a diet easy to follow. Only three students asserted that a diet similar to the 'plate' is expensive in terms of time and money. These were all British.

It would be worth researching whether students consider a balanced diet to be expensive. If they do this will constitute a severe barrier for adopting a balanced diet, especially for those people who will shortly be in the position of making decisions regarding their own and their families' diet. The fact that in this study only British students expressed this attitude may not be a serendipitous finding. In Greece, a predominantly Mediterranean and agricultural country, the foods of the green sector are massively produced and hence cheaper than in England. Consequently, a more 'green' or balanced diet may be cheaper in Greece.

Another possible explanation for the fact that only British students mentioned the high cost of a balanced diet may be that they consider several practical factors when they speak about diet, factors not considered by their Greek counterparts. This may reflect the more thorough approach to nutrition education in the English educational system. The National Curriculum Council advises that one of the topics that should be included in food and nutrition education is "Analysis and evaluation of diet in a background of social, cultural and financial situation" (see Section 1.6.2). So this may be another indication that British students are helped in their schools to look at the issue of diet from several points of view. This plurality was also apparent when the British students reasoned the messages of the 'HEA plate' (Section 6.5.4).

The different usage of the 'HEA plate' from place to place that was raised by some English students (Section A.3.3.2) seems to point to a belief that was shared by other students of both sexes and nationalities and was revealed in other parts of the interviews. According to this belief, eating at home is healthy, in contrast with eating at school, college or "out of home" where food is not so healthy. So, some students said that:

> "I like fattening foods, and many times those ready things that we eat out of the home, sandwiches and all those that are surely damaging for health and not so much fruits, vegetables" (G.4, Q.10)
>
> "We must eat mainly legumes as we see this happening in most homes ..." (G.6, Q.19)
>
> "I find no difficulty in following the right diet. For me it is not difficult at all. I find all those in my home." (G.17, Q.22)
>
> "I have got quite bad eating habits though, but I think that's a lot to do with, you know, not having enough time, I think I haven't got enough time, I just have a packet of crisps instead of eating properly or, you

> know, eating chocolate, things like that. But at home I always have healthy dinners that my mum cooks me." (B.37, Q.5)

The students who supported the notion that eating out or at school is usually unhealthy eating (an idea possibly shared by more students) may have expressed either their evaluation of the foods found in these places or their own food preferences when they are in these places. In other words, when students said that "it is difficult to follow these recommendations in school", they might be masking the fact that in school or in the fast-food restaurant they usually 'go on the loose'. As health consciousness in society grows, available foods and snacks in school canteens and public restaurants are expected to become more varied and of higher quality. In fact, such improvements may have already occurred in the public places where the afore-mentioned students feed. The question is whether these positive changes are noticed and profited upon by young people or overlooked. In some cases the attitude "that food away from home is damaging food" may disguise a deliberate practice of eating out in order to indulge in some of those 'damaging foods', which are not available at home.

The number of students who expressed similar positions without any relevant stimulus on the part of the interviewer suggests that this may be a position held by many students. Such positions can be used in nutrition education for igniting debates on the healthiness of food, on food availability and on the factors that finally determine food choices. Such debates will hopefully make students more capable of distinguishing between the objective or external and the subjective or internal factors that determine their eating practices.

A.3.5.3 Sources of information

A.3.5.3.1 Students' ideas about the sources of information

Family, media, school, and personal contact with doctors, each of these sources of information have influenced half or more of the students of the sample. None of the respected sources, however, gathered equally large acceptance from the students. A general trend revealed from the statistics presented in table A.17 is that the respected sources of information are more professional than the actual sources. This is applicable to a greater extent for the Greek students than for the English ones (table A.18) who appear highly to esteem some lay sources of information, especially family. The general conclusion related to the connection between actual and valued sources of information is that the more professional the source of information that is recognized as an actual source by a number of students, the greater the percentage of those students who value it.

More British students than Greeks recognize school as both an influential and a reliable source of information. Thus, the superiority of the British approach in health education, and especially nutrition education, compared to the Greek educational system, which is discussed in Section 1.6, is reflected in students' meta-cognition. The hypothesis that students do esteem well designed and delivered health education is corroborated by another study undertaken among students of a secondary school with a well-structured health education programme (Coleman 1995), where it was found that the students recognized the biology curriculum as their main influence on matters of nutrition and disease. In Coleman (1995) it was found also that boys were influenced to a greater extent than the girls by the school curriculum whereas in the present study an opposite trend was shown, without statistical significance though.

A remarkable difference between the professional and the non-professional sources of information is that the latter were valued only by the students who considered them as actual sources of information. The knowledge from the professionals, though, was respected by the students who considered them as actual sources of information and by others who did not (see table A.17). One wonders how somebody can appreciate something that s/he doesn't know, i.e. how nine students said that they valued the experts' knowledge that they admitted they ignored. The explanation of this paradox may have to do with the positive attitude that some people have towards science. So these students may trust doctors and/or dietitians simply due to the fact that they are the "scientists" or the "experts".

In a survey carried out by the National Dairy Council (via Stockley 1993), it was found that for British teenagers the most reliable sources of information on healthy eating were teachers (57%), parents (44%), doctors (39%), books (31%), nurses (26%) and TV/radio programmes (24%). This ranking of reliability on sources of information was found to be similar in the present study but with each source of information collecting smaller percentages of recognition. So in this study 40% of the British students value school's information on healthy diet, 35% family's information, 35% doctors' information and just 5% the media (table A.16).

In a Lickert-type question of a survey (HEA 1992a), 62% of young adults agreed that "Experts never agree which foods are good for you", and only 18% disagreed with this statement. In the present study only 35% of the British students regarded doctors' and dietitians' information as valid. These two findings taken together suggest that the trust of British youth in the experts is somehow shaken, especially when it is compared to the huge support that these sources of information have among Greek students (table A.16). It would be very interesting to explore the reasons for this disillusionment. However, it is highly improbable that these young people have witnessed any scientific controversy regarding the recommended foods, as such controversy hardly exists (see Section 1.3.3). Possible misunderstandings about the identity of the experts and the nature of nutritional debates may have resulted in such disillusionments. In other words, students may perceive as experts those people who try to build up their personal reputation by attacking the rudiments of healthy eating and/or students may perceive the different scientific debates concerning the physiological role of certain nutrients as gross disagreements ruining the whole edifice of information about healthy eating.

Surveys like the previously mentioned one that present subjects with challenging and sophisticated statements must be given special attention. Such statements are liable to collect extraordinarily high endorsement, especially among adolescents, as young people are by nature unconventional and disputatious. Additionally, such statements may disseminate false impressions among the participants in a survey. In the case of the HEA (1992a) survey some of the participants may have established misunderstandings or reinforced some latent faulty ideas concerning the authority of the discipline of nutrition and this in turn may have a negative impact on their attitudes about healthy eating. So, by using such prefabricated and misleading statements in surveys, one runs the risk of gathering unreliable results and influencing the participants' attitudes unfairly.

In Section 5.5.1.1 it was discussed how seldom the students of the present study referred to senses and feelings while speaking about healthy diet. However, 3 of the 4 students who reported learning from personal experience referred to senses and not to diseases. This is quite reasonable as the negative outcomes of an imbalanced diet in the form of morbidity are expected to show after a long time. For young people most of the tangible outcomes of diet have to do with the way that they feel after eating some foods, in certain times and in certain quantities. This is another point that might be taken into account in nutrition education. Presenting the prevention of some potential diseases to young people as an incentive about eating well may be a tactic with not much personal relevance for them. On the contrary, igniting a discussion about what they have learnt from their own experience about the healthiness or unhealthiness of food may prove more involving.

A.3.5.3.2 Sources of information, correlated with the reported kind of diet and with beliefs and mental processes

The results in table A.19 reveal that there is a very strong positive correlation between the nature of the actual sources of information and the valued sources, i.e. the students of the present study tend to a great extent to value sources of information of the same nature as those that the students believe they listen to. It is also found that the more the students believe that they share the knowledge of the professionals the more they believe that they try to eat well. The second correlation just approached statistical significance. "Eating well", however, is not something that everybody understands in the same way; so this correlation does not necessarily mean that students who listen to professionals on dietary matters apply what the professionals say. Finally, no positive or negative correlations between the variables describing the influence by sources of information and depth or accuracy of knowledge and beliefs were found.

The general conclusion from this analysis is that although the students who tend to either believe that they are influenced by professional sources of information or (tend to) value them are more likely to state that they have a more healthy diet, this assertion is not substantiated by the reported details of their diet, nor do they appear better informed or skilled than the rest of the students with regard to dietary matters. Possibly, healthy eating is nowadays disseminated by different sources of information which are not strictly professional. So, students may entertain beliefs that they wrongly assume derive from the professionals. Another explanation (especially for the fact that students declaring their appreciation for the professionals' knowledge do not appear more knowledgeable on matters of diet) is that "the on-site propagators of an innovation (the experts of healthy diet) are mainly dealing with the how-to-knowledge" (Section 2.2.2). It is likely that such propagators are neither scientists nor physicians. In the case of diet they may be trainers, reporters or parents who in fact may modify the content and the rationale of that knowledge, or may neglect the transmission of principles-knowledge.

Two main explanations can be given for the fact that those students who stated that are influenced by the experts' knowledge are virtually indistinguishable in terms of knowledge and mental abilities, from the rest who don't believe so. One explanation is that today the basic guidelines of a healthy diet are so widespread that someone may listen to lay people who are very articulate on the issue. So, because it is sometimes difficult to distinguish between experts' and lay people's knowledge on balanced diet, some students perceive experts' knowledge as lay people's knowledge.

The opposite, i.e. assuming lay people's knowledge as experts' knowledge, can also stand as an explanation. But here lurks a danger. If lay people's knowledge differs from that of the experts, the person who makes this assumption is in a state of confusion, which is worse than confessed ignorance. After all, someone who trusts unreliable knowledge is very unlikely ever to make an effort to upgrade or revise it. On the other hand, someone who has realized his/her ignorance is more likely at sometime to seek guidance and training.

A wider study could seek to corroborate the possibility expressed in the previous paragraph. If it is found that students indeed confuse the status of their sources of information, then this should be really a matter for concern and action in the classroom should be taken.

A.3.6 Conclusion

In Section A.3.1 it was asked **'how sound and practical do the students find educational materials like the 'HEA plate'?'**. In the light of the findings presented in this appendix we can conclude that all the students found that the 'HEA plate' can only have a positive impact on both good- and ill-health and most of them valued this impact. Some reservations expressed by a number of students on specific aspects of the 'plate' can be attributed to misinformation, questionable beliefs, or overstatement of the appropriate nutritional messages from their part. However, one student interpreted the 'plate' as a means of manipulation of peoples' habits. The chances of such an interpretation from the part of young people should not be underestimated.

The 'plate' also looked handy to most of the students. The reservations expressed about the practicality of applying it are related to existing eating practices and in some cases with food availability in public places and especially schools. As a tool of contemplation on one's own diet it seems that the 'plate' can play only a unilateral role: the students focused more on the foods that should be eaten in large quantities, than on those that should be taken moderately. However, the 'plate' proved a more proper tool for igniting conceptual change.

This appendix also attempted to find out **what sources of information students listen to and which ones they value**. According to the findings presented here, it seems that students understand that their information on dietary matters derives from sources that differ in nature. Generally, the students respect those sources that they believe they are influenced by. This applies to a greater extent to the professional sources (doctors, dietitians), to a lesser degree to semi-professional sources (school, media, trainers) and to a very small degree to lay sources (family, personal experience). More Greek students respect the professional sources of information compared to the British students, whose confidence to the professionals appears somewhat shaken.

The few students who reported learning from personal experience described mechanisms involving mainly senses, not diseases.

The last question posed in this appendix was **'to what extent do students' judgments about educational materials and sources of information depend on or interact with their eating practices and beliefs about diet?'** No connection was found between the way that the students assessed the 'HEA plate' and their own status of knowledge or ability to reflect on dietary matters. The way that they evaluated the 'plate', though, was positively correlated with the understanding of healthy eating that points to weight control.

The way that the students ranked the sources of knowledge as influential or reliable was not found to have any kind of association with their own level of knowledge or mental skills. It is hypothesized that the students may have not developed a sound understanding of the nature of dietary knowledge, which may impair the advancing of their own training in this matter.

It was hypothesized that personal experiences, preferences, eating habits and values cannot but influence the positioning of a person against the principles and rules of a dietary paradigm. The fact that in this study no finding revealed a general relationship between beliefs, practices, skills and metacognition does not mean that this hypothesis is necessarily invalid.

An unscheduled finding that emerged in the course of the discussions about the usage of the 'HEA plate' is that some students believe that food at home is healthy, whereas food away from home is unhealthy. Because it cannot be generally accepted as true that ready-to-consume food sold in school, restaurants etc is unhealthy food, it was hypothesized that the expression of that belief may mask the habit of some students to eat out in order to indulge in some (as they believe) unhealthy foods.

In the light of these findings the following suggestions can be made for nutrition education:

- Teaching the rudiments of a balanced diet should be done with the use of messages that are not characterized by exaggerations. In other words, the instruction on balanced diet should be characterized by moderation.
- If we wish to take full advantage of materials like the 'HEA plate' within the classroom, we should discuss their applicability and possible student

reservations. This strategy may challenge students' ideas, reveal misunderstandings and provoke conceptual change.

- Instruction about the nature of the discipline of nutrition and its methods would help to reduce existing confusion about who the professionals of dietetics are.

Further research is suggested on the following issues:

- Students' judgments of the cost of a balanced diet could be examined in connection with current prices in the food market.
- Students' evaluations of the quality of ready-to-eat foods in public places could be examined in connection with food availability in the same places.

REFERENCES AND BIBLIOGRAPHY

1. ENGLISH LITERATURE

AARTS H., PAULUSSEN T. & SCHAALMA H. (1997). Physical exercise habit: on the conceptualization and formation of habitual health behaviours. Health Education Research 12, 3: 363-374.

ACHTERBERG C. & LARSON CLARK K. (1992). A retrospective examination of theory use in nutrition education. Journal of Nutrition Education 24, 5: 227-233.

ACHTERBERG C. (1994). Qualitative research: what do we know about teaching good nutritional habits? The Journal of Nutrition 124: 1808S- 1812S.

ACHTERBERG C., McDONNELL E. & BAGBY R. (1994). How to put the food guide pyramid into practice. Journal of the American Dietetic Association 94:1030-1035.

AJZEN I. & FISHBEIN M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. Psychological Bulletin 84, 5: 888-918.

AJZEN I. & FISHBEIN M. (1973). Attitudinal and normative variables as predictors of specific behaviors. Journal of Personality and Social Psychology 27, 1: 41-57.

ALLRED J. (1992). Lowering serum cholesterol: Who benefits? The Journal of Nutrition 123: 1453-1459.

AMSCHLER D.H. (1999). Calcium intake in adolescents: an issue revisited. Journal of School Health 69, 3: 120-122.

ANDERSON A.S., COX D.N., McKELLAR S., REYNOLDS J., LEAN M.E. & MELA D.J. (1998). Take Five, a nutrition education intervention to increase fruit and vegetable intakes: impact on attitudes towards dietary change. British Journal of Nutrition 80, 133-140.

ANDERSON A.S., HUNT K., FORD G. & FINNIGAN F. (1994). One apple a day? - fruit and vegetable intake in the West of Scotland. Health Education Research 9, 3: 297-305.

ANLIKER J.A., DRAKE L.T., PACHOLSKI J. & LITTLE W. (1993). Impacts of a multi-layered nutrition education program: Teenagers teaching children. Journal of Nutrition Education 25,3,140-143.

ANSELMO OLINTO M. T., VICTORA C. G., BARROS F. C. & PETRUCCI GIGANTE D. (1995). Twenty-four-hour recall overestimates the dietary intake of malnourished children. The Journal of Nutrition 125: 880-884.

ASCHERIO A. (1995). New directions in dietary studies of coronary heart disease. The Journal of Nutrition 125, 3S: 647S-655S.

ASSOCIATION FOR SCIENCE EDUCATION (1992). Science across Europe Association for science education.

AULD G., ACHTERBERG C., DURRWACHTER J. & NOVAK J. (1991). Gender differences in adults' knowledge about fat and cholesterol. Journal of the American Dietetic Association 91, 11: 1391-1397.

AXELSON M.L. & BRINBER G D. (1992). The measurement and conceptualization of Nutrition Knowledge. Journal of Nutrition Education 24, 5: 239-246.

BANDURA A. (1995). 'Exercise of personal and collective efficacy in changing societies' in BANDURA A. (ed, 1995): 1-45.

BANDURA A. (Ed) (1995). Self-efficacy in changing societies. Cambridge University Press.

BANDURA A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review 84, 2: 191-215.

BARANOWSKI T. (1992). Beliefs as motivational influences at stages in behavior change. International Quarterly of Community Health Education 13, 1: 3-29.

BARANOWSKI T., DOMEL S., GOULD R., BARANOWSKI J., LEONARDS., TREIBER F. & MULLIS R. (1993). Increasing fruit and vegetable consumption among 4th and 5th grade students: Results from focus groups using reciprocal determinism. Journal of Nutrition Education 25, 3: 114-120.

BARNES D. (1976). From communication to curriculum. Penguin Books.

BAYDOUN E., HERNANDEZ D., SCHAEFER G., STYRZ I. & WILLE J. (1987). 'The concept of health: free association tests' in Kelly & Lewis (eds, 1987): 27-34.

BECKER M.H., MAIMAN L.A., KIRSCHT J.P., HAEFNER D.P. & DRACHMAN R.H. (1977). The health belief model and prediction of dietary compliance: a field experiment. Journal of Health and Social Behavior 18: 348-366.

BELL J. (1991). Doing your research project. Open University Press Buckingham Philadelphia.

BENDICH A (1992). Vitamins and immunity. The Journal of Nutrition 122: 601-603.

BENNETT P., NORMAN P., MURPHY S., MOORE L. & TUDOR-SMITH C. (1998). Beliefs about alcohol, health locus of control, value for health and reported consumption in a representative population sample. Health Education Research Theory & Practice 13, 1: 25-32.

BOURDEAUDHUIJ (DE) ILSE. (1997). Perceived family members' influence on introducing healthy food into the family. Health Education Research 12,1: 77-90.

BOWKER S., CROSSWAITE C., HICKMAN M., CcGUFFIN S. & TUDOR-SMITH C. (1998). The healthy option - a review of activity on food and nutrition by UK schools involved in the European Network of Health Promoting Schools. Health Education 4: 135-141.

BOX V. & LANDMAN J. (1994). Children who have no breakfast. Health Education 4: 10-13.

BRANNEN J., DODD K., OAKLEY A. & STOREY P. (1994). Young people, health and family life. Open University Press.

BROWN N. (1980). 'Some observations on family eating patterns' in Turner M (Ed 1980): 149-155.

BRUMBY M. (1979). Problems in learning the concept of natural selection. Journal of Biological Education 13, 2: 119-122

BRUNE M., ROSSANDER-HULTEN L., HALLBERG L., GLEERUP A. & SANDBERG A-S. (1992): Iron absorption from bread in humans: inhibiting effects of cereal fiber, phytate and inositol phosphates with different numbers of phosphate group. The Journal of Nutrition 122: 442-449.

BRUNER JEROME S. (1966) Toward a Theory of Instruction. The Belknap Press of Harvard University Press.

BUCHANAN D. (1998). Beyond positivism: humanistic perspectives on theory and research in health education. Health Education Research Theory & Practice 13, 3: 439-450.

BURR M. (1994). Antioxidants and cancer. Journal of Human Nutrition and Dietetics 7: 409-416.

CARPENTER A., FORSTER S., PATSY H.,LIVELY J., MELVIN K., MUIRDEN J., PARKES B. & THORNEYCROFT S. (1986). MAYFLY a study of 1237 school pupils aged 14-15 who completed the health related behaviour questionnaire in May 1983. University of Exeter.

CARTER C. (1991). Science-Technology-Society and access to scientific knowledge. Theory Into Practice 30 (4): 273-279.

CDC (1997). Guidelines for school health programs to promote lifelong healthy eating. Journal of School Health 67, 1: 9-26.

CHANDLER A., WALKER S., CONNOLLY K. & GRANTHAM-McGREGOR S. (1995). School breakfast improves verbal fluency in undernourished Jamaican children. The Journal of Nutrition 125: 894-900.

CHANDRA R.K. (1992). Protein-energy malnutrition and immunological responses. The Journal of Nutrition 122: 597-600.

CHEONG-HOONG DIONG (1987). 'New Directions for Teaching'. In Rao A.N. (Ed 1987): 101-104.

COLEMAN E. (1995). Health-related knowledge: where does it come from? Journal of Biological Education 29, 2: 139-146.

CONTENTO I. (1980). Thinking about nutrition education: What to teach, how to teach it, and what to measure. Teachers College Record 81: 421-447.

CONTENTO I (1981). Children's thinking about food and eating - A Piagetian-based study. Journal of Nutrition Education 13, 1: S86-S90.

CONTENTO I.R. & MAKSYMOWICZ MURPHY B. (1990). Psycho-social factors differentiating people who reported making desirable changes in their diets from those who did not. Journal of Nutrition Education 22: 6-14.

CONTENTO I.R., MANNING A.D. & SHANNON B. (1992). Research perspective on school-based nutrition education'. Journal of Nutrition Education 24, 5: 247-260.

COUNCIL OF EUROPE (1999). 'The challenges of science education' Council of Europe Publishing.

COVENEY J. (1998). The government and ethics of health promotion: the importance of Michel Foucault. Health Education Research Theory & Practice 13, 3: 459-468.

COX B., HUPPERT F. & WHICHELOW M. (Eds 1993). The health and lifestyle survey: Seven years on" Dartmouth.

CRAWFORD P. B., OBARZANEK E., MORRISON J. & SABRY Z. I. (1994). Comparative advantage of 3-day food records over 24-hour recall and 5-day food frequency validated by observation of 9- and 10-year-old girls. Journal of the American Dietetic Association 94: 626-630.

CROCKETT J. (1985). 'What's in a Word? - students' alternative framework' in Turner A.S. & Ingle R.B (Eds 1985): 97-99.

DAVID K. & WILLIAMS T. (Eds) (1987). Health education in schools. Harper Education Series.

DALLONGEVILLE J., MARECAUX N., FRUCHART J-C & AMOUJET P. (1998). Cigarette smoking is associated with unhealthy patterns of nutrient intake: a meta-analysis. The Journal of Nutrition 128: 1450-1457.

DEKKER J.A. & VAN DER VALK A.E. (1986). Pre-university physics presented in a thematic & systematic way: Experiences with a Dutch physics curriculum development project. European Journal of Science Education 8, 2: 145-153.

DENZIN N. & LINCOLN Y. (1994). Handbook of qualitative research. SAGE Publications London New Dehli.

DEPARTMENT FOR EDUCATION (1991). Science in the National Curriculum. London HMSO.

DEPARTMENT FOR EDUCATION (1995) (a). Information technology in the National Curriculum. London HMSO.

DEPARTMENT FOR EDUCATION (1995) (b). Science in the National Curriculum. London HMSO

DEPARTMENT OF HEALTH (1991). Dietary Reference Values for Food Energy and Nutrients for the United Kingdom. London HMSO.

DEPARTMENT OF HEALTH (1994). Nutritional Aspects of Cardiovascular Disease. London HMSO

DEPARTMENT OF HEALTH (1996). Guidelines on Educational Materials concerned with Nutrition. Department of Health.

deVRIES H.A. & HOUSH T.J. (1990). Physiology of Exercise. WCB Brown & Benchmark Madison, Wisconsin. Dubuque, Iowa.

DITTUS K., HILLERS V. & BEERMAN K. (1995). Benefits and barriers to fruit and vegetable intake: Relationship between attitudes and consumption. Journal of Nutrition Education 27: 120-126.

DOCHY F.J.R.C (1992). Assessment of prior knowledge as a determinant for future learning. Uitgeverij Lemma B.V. Utrecht.

DOMEL S.B., LEONARD S.B., BARANOWSKI T. & BARANOWSKI J. (1993). "To be or not to be..." Fruits and Vegetables. Journal of Nutrition Education 25, 6: 352-358.

DOMEL BAXTER S. (1998). Are elementary schools teaching children to prefer candy but not vegetables? Journal of School Health 68, 3: 111-113.

DOMEL S.B., BARANOWSKI T., DAVIS H.C., THOMPSON W.O., LEONARD S.B. & BARANOWSKI J. (1995) A measure of outcome expectations for fruit and vegetable consumption among fourth and fifth grade children: reliability and validity. Health education research 10, 1: 65-72.

DOMEL S.B., BARANOWSKI T., DAVIS H., THOMPSON W.O., LEONARD S., RILEY P., BARANOWSKI J., DUDOVITZ B. & SMYTH M. (1993). Development and evaluation of a school intervention to increase fruit and vegetable consumption among 4th and 5th grade students. Journal of Nutrition Education 25, 6: 345-349.

DONOVAN J.E., JESSOR R. & COSTA F.M. (1993). Structure of health-enhancing behavior in adolescence: a latent-variable approach. Journal of Health and Social Behavior 34: 346-362.

DONTAS A.S., MENOTTI A., ARAVANIS C., CORCONDILAS A., LEKOS D. & SECCARECCIA F. (1993). Long-term prediction of coronary heart disease mortality in two rural Greek populations. European heart journal 14: 1153-1157.

DOWNIE R.S., FYFE C. & TANNAHILL A. (1992). Health promotion models and values. Oxford University Press.

DREVER E. (1995) Using Semi-Structured Interviews in Small-Scale Research. The Scottish Council for Research in Education.

DRIVER R (1991). 'Theory into Practice II: A Constructivist Approach to Curriculum Development' in Fensham P (ed)(1991): 133-149.

DUBOS R. (1965)
Man adapting
(Yales University Press, New Haven and London).

DUNCAN P. & CRIBB A. (1996) 'Helping people change - an ethical approach?'. Health Education Research Theory & Practice 11 (3): 339-348.

DUPONT J. & MATHIAS M. (1994) 'Future Directions for Nutrient Requirements-Lipids'. The Journal of Nutrition 124: 1743S-1746S.

DUNCAN P. & CRIBB A. (1996) 'Helping people change-an ethical approach?' Health Education Research 11,3, 339-348

DWYER J. (1995) 'Overview: Dietary Approaches for Reducing Cardiovascular Disease Risks' The Journal of Nutrition 125,3S, 656S-665S

EBISON M. (1986) 'Newtonian in mind but Aristotelian at heart' in Thomsen (ed.) (1986)

ERDMAN J. (1995) 'Summary of the Papers presented during the first International Symposium on the Role of Soy in Nutrition' The Journal of Nutrition 125,3S, 798S

FARLEY P. (1987) 'English and health education' in David K. & Williams T. (Eds 1987): 140-155.

FENSHAM P (1991) 'Some Dilemmas and New Directions in Science Education' in Fensham P (ed 1991): 1-26.

FENSHAM P.J. (1988). Approaches to the teaching of STS in science education. International Journal of Science Education 10,4: 346-356.

FENSHAM P (Ed) (1991). Development and Dilemmas in Science Education. London: The Falmer Press.

FERRO-LUZZI A., CIALFA E., LECLERCQ C. & TOTI E. (1994). The Mediterranean diet revisited. Focus on fruit and vegetables. International Journal of Food Sciences and Nutrition 45: 291-300.

FOTSIS T., PEPPER M., ADLERCREUTZ H., HASE T., MONTESANO R., & SCHWEIGERER L. (1995). Genistein, a dietary ingested isoflavonoid, inhibits cell proliferation and in vitro angiogenesis. The Journal of Nutrition 125, 3S: 790S-797S.

FREY K (1989). Integrated science education: 20 years on. International Journal of Science Education 11, 1: 3-17.

GANS M., SUNDARAM S., McPHILLIPS J., HIXSON M., LINNAN L. & CARLETON A. (1993). Rate your plate: An eating pattern assessment and educational tool used at cholesterol screening and education programs. Journal of Nutrition Education 25, 1: 29-36.

GAST J. & HAWKS S. (1998). Weight loss education: the challenge of a new paradigm. Health Education & Behavior 25, 4: 464-473.

GAULL G.E. & YEATON WOO R.W. (1996). Biotechnology and Society: We scientists have responsibilities too. Journal of Nutrition 126: 1017S-1019S.

GILLESPIE A.H. & BRUN J.K. (1992). Trends and challenges for nutrition education research. Journal of Nutrition Education 24, 5: 222-226.

GLANZ K. & ERIKSEN M. (1993). Individual and community models for dietary behavior change. Journal of Nutrition Education 25, 2: 80-86.

GLANZ K., & RUDD J. (1993). Views of theory, research, and practice: a survey of nutrition education and consumer behavior professionals. Journal of Nutrition Education 25, 5: 269-273.

GLANZ K., PATTERSON R.E., KRISTAL A.R., DiCLEMENTE C.C., HEIMENDINGER J., LINNAN L. & McLERRAN D. (1994). Stages of change in adopting healthy diets: fat, fiber, and correlates of nutrient intake. Health Education Quarterly 21, 4: 499-519.

GLANZ K., BASIL M., MAIBACH E., GOLDBERG F. & SNYDER D. (1998). Why Americans eat what they do: Taste, nutrition cost, convenience, and weight control concerns as influences on food consumption. Journal of the American Dietetic Association 98: 1118-1126.

GOWIN B.D. (1981). Educating. Cornell University Press.

GRACEY D., STANLEY N., BURKE V., CORTI B. & BEILIN L.J. (1996). Nutritional knowledge, beliefs and behaviours in teenage school students. Health Education Research 11, 2: 187-204.

GREENE G.W., ROSSI S.R., RICHARDS REED G., WILLEY C. & PROCHASKA J.O. (1994). Stages of change for reducing dietary fat to 30% of energy or less. Journal of the American Dietetic Association 94: 1105-1110.

GREEN N.P.O., STOUT G.W., TAYLOR D.J. & SOPER R. (1990). Biological science 1. Cambridge University Press.

GREEN T. J., ALLEN O. B. & O' CONNOR D. L. (1998). A three-day weighed food record and a semiquantitative food-frequency questionnaire are valid measures for assessing the folate and vitamin B-12 intakes of women aged 16 to 19 years. The Journal of Nutrition 128: 1665-1671.

GREIDANUS I. & CONTENTO I. (1989). The relationship between the ability to solve practical nutrition problems in an adult population and piagetian cognitive levels. Journal of Nutrition Education 21, 2: 73-81.

GRIMME H.L. (1987). 'Nutrition and agricultural education based on biological principles' in Rao A.N. (Ed 1987): 227-231.

GUMMESON L., JONSSON I., CONNER M.T. & SVENSSON E. (1996). Assessing factors influencing food choice among 10- 16-year-old schoolboys. A pilot study with a stacking box method. Journal of Human Nutrition and Dietetics 9: 219-229.

GUTHRIE J. (1994). Quantitative nutrition education research: Approaches, findings, outlook. The Journal of Nutrition 124: 1813S-1819S.

HALL C. (1987). 'Operation Cat Drop' in Rao A.N. (Ed 1987): 149-151.

HAMBLIN D. (1980). 'Adolescent attitudes towards food' in Turner M. (Ed 1980): 119-135.

HARDING J. & DONALDSON J. (1986). Chemistry from issues. School Science Review 68, 242: 48-59

HARVEY J. & PASSMORE S. (1994). Action on nutrition. Health Education 5:15-18.

HAYES D. & ROSS C.E. (1987). Concern with appearance, health beliefs, and eating habits. Journal of Health and Social Behavior 28: 120-130.

HEAD M.J. (1987). Health beliefs in adolescence: perceptions and control. Health education journal 46, 3: 100-103.

HEALTH EDUCATION AUTHORITY (1990). Diet and cancer. Briefing paper. Health Education Authority London.

HEALTH EDUCATION AUTHORITY (1992a). Today's young adults. Health Education Authority London.

HEALTH EDUCATION AUTHORITY (1992b). Scientific basis of nutrition education. Health Education Authority London.

HEALTH EDUCATION AUTHORITY (1995). Diet and health in school age children - Nutrition briefing paper. Health Education Authority London.

HEDDERSON J. (1991). SPSS/PC+ MADE SIMPLE. Wadsworth Publishing Company Belmont, California.

HERGENHAHN B.R. (1993). An introduction to theories of learning. B.R. Hergenhahn, Matthew H. Olson.

HERMAN J.L, MORRIS L.L., FITZ-GIBBON C.T. (1987). Evaluator's Handbook. Newbury Park, Calif: Sage Publications.

HERMAN C., ADLERCREUTZ T., GOLDIN B., GORBACH S., HOCKERSTEDT K., WATANABE S., HAMALAINEN E., MARKKKANEN H., MAKELA T., WAHALA K., HASE T. & FOTSIS T. (1995). Soybean Phytoestrogen Intake and Cancer Risk. The Journal of Nutrition. 125, 3S: 757S-770S.

HERNANDEZ D.F. & BALTAZAR V.B. (1987). 'Topics in biology teaching' in Rao A.N. (Ed 1987): 173-176.

HEWSON P.W. & A'BECKETT HEWSON M.G. (1984). The role of conceptual conflict in conceptual change and the design of science instruction. Instructional Science 13: 1-13.

HODSON D (1992). In Search of a meaningful relationship: an exploration of some issues relating to integration in science and science education. International Journal of Science Education 14, 5: 541-562.

HOWISON D., NIEDERMYER F. & SHORTRIDGE R. (1988). Field testing a fifth-grade nutrition education program designed to change food-selection behavior'. Journal of Nutrition Education 20, 2: 82-86.

HULL T. (1987). 'Science and health education' in David K. & Williams T. (Eds 1987): 120-139.

HURRELMANN K., LEPPIN A. & NORDLOHNE E. (1995). Promoting health in schools: the German example. Health promotion international 10, 2: 121-131.

JAMES D., RIENZO B. & FRAZEE C. (1997). Using focus groups to develop a nutrition education video for high school students. Journal of School Health 67, 9: 376-379.

JAMES J., AULD G.W., & SLATER M. (1993). Dietitians' knowledge structure relative to fat and cholesterol. Journal of Nutrition Education 25, 4: 193-200.

KALNINS I.V., HART C., BALLANTYNE P., QUARTARO G., RHONDA L., STURIS G. & POLLACK P. (1994). School-based community development as a health promotion strategy for children. Health Promotion International 9, 4: 269-279.

KEEN H., THOMAS B.J., JARRETT R.J. & FULLER J.H. (1979). Nutrient intake, adiposity, and diabetes. British Medical Journal 1, 655-658.

KELLY P.J. & LEWIS J.L. (Eds) (1987). Education and Health. (Pergamon Press).

KENNEDY A. (1995). The evidence for soybean products as cancer preventive agents. The Journal of Nutrition 125, 3S: 733S-743S.

KING K.A. (1997). Self-concept and self-esteem: a clarification of terms. Journal of school health. 67, 2: 68-70.

KLEPP K.-I. & WILHELMSEN B.U. (1993). Nutrition education in junior high schools: incorporating behavior change strategies into home economics courses. Health Education Research Theory & Practice 8, 4: 547-554.

KRAMISH CAMPBELL M., REYNOLDS K., HAVAS S., CURRY S., BISHOP D., NICKLAS T., PALOMBO R., BULLER D., FELDMAN R., TOPOR M., JOHNSON C., BERESFORD S., McADAMS MOTSINGER B., MORRILL C. & HEIMENDINGER J (1999). Stages of change for increasing fruit and vegetable consumption among adults and young adults participating in the national 5-a-day for better health community studies. Health Education & Behavior 26, 4: 513-534.

KRATHWOHL D.R., BLOOM B.S. & MASIA B.B. (1956). The classification of Educational Goals. Handbook II: Affective Domain. LONGMANS.

KRATHWOHL D.R. & BLOOM B.S. (1959) Taxonomy of educational objectives. The classification of educational goals. Handbook 1: cognitive domain. LONGMANS.

KRISTAL A. R., ANDRILLA H. A., KOEPSELL T. D., DIEHR P.H. & CHEADLE A. (1998). Dietary assessment instruments are susceptible to intervention-associated response set bias. Journal of the American Dietetic Association 98: 40-43.

KRISTAL A., GLANZ K., TILLEY B. & SHUHUI L. (2000). Mediating factors in dietary change: Understanding the impact of a worksite nutrition intervention. Health Education & Behavior 27, 1: 112-125.

KRITCHEVSKY D. (1995). Dietary protein, cholesterol and atherosclerosis: A review of the early history. The Journal of Nutrition 125: 589S-593S.

LANDS W. (1993). A Summary of the Workshop "Alcohol and Calories: A Matter of Balance". The Journal of Nutrition 123: 1338-1341.

LAU R.R. (1982). Origins of Health Locus of Control beliefs. Journal of Personality and Social Psychology 42, 2: 322-334.

LECHNER L., BRUG J., DE VRIES H., VAN ASSEMA P. & MUDDE A. (1998). Stages of change for fruit, vegetable and fat intake: consequences of misconception. Health Education Research Theory & Practice 13, 1: 1-11.

LEVY A., FEIN S. & STEPHENSON M. (1993). Nutrition knowledge levels about dietary fats and cholesterol: 1983-1988. Journal of Nutrition Education 25, 2: 60-66.

LEWIS J.L. (1987). 'An Example of a decision-making simulation game "The Marimbian Health Service Project"' in Kelly & Lewis (eds 1987): 209-212.

LIETAER D. (1999). 'Science teaching as a key component of education for democratic citizenship' in Council of Europe (ed) 1999: 47-60.

LIJNSE P, KORTLAND K, EIJKELGOF H, VAN GENDEREN D & HOOYMAYERS H (1990). A thematic physics curriculum: A balance between contradictory curriculum forces. Science Education 74, 1: 95-103.

LOWE M. (1980). 'Influence of changing ligestyles on food choice' in Turner M. (Ed 1980): 141-148.

LUNAGH M, SCHOFIELD M.J. & SANSON-FISHER R.W. (1997). School health promotion programs over the past decade: a review of the smoking, alcohol and solar protection literature. Health Promotion International 12, 1: 43-60.

MAIMAN L.A. & BECKER M.H. (1974). The Health Belief Model: Origins and correlates in psychological theory. Health Education Monographs 2, 4: 336-353.

MAKI P. & NEWBERNE P. (1992). Dietary lipids and immune function. The Journal of Nutrition 122: 610-614.

MANN G.V. (1993). Coronary heart disease. The dietary sense and nonsense. Janus Publishing Company London, England.

MARCOUX B.C. & SHOPE J.T. (1997). Application of the Theory of Planned Behavior to adolescent use and misuse of alcohol. Health Education Research 12, 3: 323-331.

MARTINS I. (1993). Pre-conceptions in action in the construction of semantic networks. Unpublished paper presented in the 3rd misconceptions seminar.

MARTORELL R. (1995). Results and implications of the INCAP follow-up study. The Journal of Nutrition 125: 1127S-1138S.

MASSEY L. (1993). Dietary factors influencing calcium and bone metabolism: Introduction. The Journal of Nutrition 123: 1609-1610.

MATHEWS C.E., HEBERT J.R., OCKENE I.S., SAPERIA G. & MERRIAM P.A. (1997). Relationship between leisure-time physical activity and selected dietary variables in the Worcester Area Trial for counseling in hyperlipidemia. Medicine & Science in sports and exercise 29: 1199-1207.

MAY W (1992). What Are the Subjects of STS-Really? Theory Into Practice 31, 1: 73-83.

MAYER V.M. (1987). 'Agriculture and biology education' in Rao A.N. (Ed 1987): 31-39.

McBRIDE N.T. & MIDFORD R. (1996). Assessing organizational support for school health promotion. Health Educational Research 11, 4: 509-518.

McGILLY K. (1994) (ed). Classroom Lessons: Integrating Cognitive Theory and Classroom Practice. A Bradford Book The MIT Press

McGILLY K. (1994). Cognitive science and educational practice: An introduction' in McGILLY K. (1994 ed): 3-21.

McGRAW S.A., STONE E.J., OSGANIAN S.K., ELDER J.P., PERRY C.L., JOHNSON C.C., PARCEL G.S., WEBBER L.S. & LUEPKER R.V. (1994). Design of process evaluation within the child and adolescent trial for cardiovascular health (CATCH). Health Education Quarterly S2: S5-S26.

McKENZIE J. (1980). 'Economic influences on food choice' in Turner M. (Ed 1980): 94-96.

McLAUGHLIN J., OWEN S., FORS S. & LEVINSON R. (1992). The schoolchild as health educator: diffusion of hypertension information from sixth-grade children to their parents. Qualitative studies in Education 5, 2: 147-165.

MELA D. J. & AARON J. I. (1997). Honest but invalid: What subjects say about recording their food intake. Journal of the American Dietetic Association 97: 791-793.

MERRON S. & LOCK R. (1998). Does knowledge about a balanced diet influence eating behaviour? School Science Review 80 (290): 43-48.

MERTZ W. (1994). A balanced approach to nutrition for health: The need for biologically essential minerals and vitamins. The journal of the American Dietetic Association 94, 11: 1259-1262.

MEYER G.R. (1987) 'The need for continuing education in food and agriculture' in Rao A.N. (Ed 1987): 51-69.

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD (1995). Manual of Nutrition Tenth edition. London HMSO.
MOE P. (1994). Future directions for energy requirements and food energy values. The Journal of Nutrition 124: 1738S-1742S.

MONTAZERI A., McGHEE S. & McEWEN J. (1998). Fear-inducing and positive image strategies in health education campaigns. International Journal of Health Promotion and Education 36, 3: 68-75.

MORREALE S.J. & SCHWARTZ N.E. (1995). Helping Americans eat right: Developing practical and actionable public nutrition education messages based on the ADA Survey of American Dietary Habits' Journal of the American Dietetic Association 95: 305-308.

MUNN P. & DREVER E. (1995). Using questionnaires in small-scale research. The Scottish Council for Research in Education.

NATIONAL CURRICULUM COUNCIL (1990). 5. Health Education. National Curriculum Council.

NEILSON J. & LARSON-BROWN L.B. (1990). College students' perception of nutrition messages: How motivating are they?" Journal of Nutrition Education 22, 1: 30-34.

NEWSOME S. (1983). The design of nutrition education programmes for multi-ethnic classrooms with special reference to the food beliefs and behaviour of adolescents. Unpublished M.Phil. Thesis submitted to the University of London, Institute of Education.

NICKLAS T.A., JOHNSON C.C., MYERS L., FARRIS R. & CUNNINGHAM A. (1998). Outcomes of a high school program to increase fruit and vegetable consumption: gimme 5 - A fresh nutrition concept for students. Journal of School Health 68, 6: 248-253.

NICOD M. (1980). 'Gastronomically speaking: Food studied as a medium of communication' in Turner M. (Ed 1980): 53-65.

NITZKE S., HARWOOD A. & WAY W. (1992). Development of an Instrument of Assess Critical Thinking Constructs in Nutrition Audiovisual Materials. Journal of Nutrition Education 24, 3: 130-135.

O'CONNOR M. (1992). Maastricht and you. Health and Education 1, 8.

OAKES M. (1987) 'The Food and agriculture topic in the Science in Society project' in Rao A.N. (Ed 1987): 141-147.

O' DEA J. & MALONEY D. (2000). Preventing eating and body image problems in children and adolescents using the health promoting schools framework. Journal of School Health 70, 1: 18-21.

OLSON J.A. (1994). Vitamins: The tortuous path from needs to fantasies. The Journal of Nutrition 124: 1771S-1776S.

OYGARD L. & RISE J. (1996). Predicting the intention to eat healthier food among young adults. Health Education Research Theory & Practice 11, 4: 453-461.

PARMENTER K., WALLER J. & WARDLE J. (2000). Demographic variation in nutrition knowledge in England. Health Education Research Theory & Practice 15, 2: 163-174.

PATTERSON R., KRISTAL A., LYNCH J. & WHITE E. (1995). Diet-cancer related beliefs, knowledge, norms, and their relationship to healthful diets. Journal of Nutrition Education 27: 86-92.

PERSKY V. & VAN HORN L. (1995). Epidemiology of soy and cancer: perspectives and directions'. The Journal of Nutrition 125, 3S: 709S-712S.

PESA J. (1999). Psychological factors associated with dieting behaviors among female adolescents. Journal of School Health 69, 5: 196-201.

PETERS J.A. (1985). 'Nutrition as a Part of a Development Education Programme' in Turner A.S. & Ingle R.B (Eds 1985): 157-162.

PLATT S. (1995). 'A slice of life'. The Guardian 18 March 1995.

POSNER G.J., STRIKE K.A., HEWSON P.W. & GERTZOG W.A. (1982). Accommodation of a scientific conception: Toward a theory of conceptual change. Science Education 66, 2: 211-227.

POTTER J. (1993). Colon cancer - Do the nutritional epidemiology, the gut physiology and the molecular biology tell the same story? The Journal of Nutrition 123: 418-423.

POVEY R., CONNER M., SPARKS P., JAMES R. & SHEPHERD R., (1998). Interpretations of healthy and unhealthy eating, and implications for dietary change. Health Education Research Theory & Practice 13, 2: 171-183.

POVEY R., CONNER M., SPARKS P., JAMES R. & SHEPHERD R., (1999). A critical examination of the transtheoretical model's stages of change to dietary behaviours. Health Education Research Theory & Practice 14, 5: 641-651.

RAO A.N. (1987 Ed). Food, Agriculture and Education. Pergamon Press.

RAO A.N. (1987). 'Discussion of issues' in in Rao A.N. (Ed 1987): 181-201.

RAPHAEL D. (1998). Emerging concepts of health and health promotion. Journal of School health 68, 7: 297-300.

RAUMA A.L., TORRONEN R., HANNINEN O. & MYKKANEN H. (1995). Vitamin B-12 status of long-term adherents of a strict uncooked vegan diet ("Living food diet") is compromised. Journal of Nutrition 125: 2511-2515.

RAW I. (1987). 'Nutrition and Science Education' in Rao A.N. (Ed 1987): 80-89.

RAW I. (1985). 'Nutrition Education as Viewed in the Context of Science Education' in Turner A.S. & Ingle R.B (Eds 1985): 100-103.

REEVE R.A., PALINCSAR A.S. & BROWN A. (1987). Everyday and academic thinking: implications for learning and problem solving. Journal of Curriculum Studies 19, 2: 123-133.

RESNICOW K. & REINHARDT J. (1991). What do children know about fat, fiber, and cholesterol? A survey of 5,116 primary and secondary school students. Journal of Nutrition Education 23, 2: 65-71.

RICKARD K.A., GALLAHUE D.L., GRUEN G.E. TRIDLE M. BEWLEY N. & STEELE K. (1995). The play approach to learning in the context of families and schools: An alternative paradigm for nutrition and fitness education in the 21st century. Journal of the American Dietetic Association 95, 10: 1121-1126.

ROCKETT H. R. H., WOLF A. M., & GOLDITZ G. A. (1995). Development and reproducibility of a food frequency questionnaire to assess diets of older children and adolescents. Journal of the American Dietetic Association 95: 336-340.

ROIG M.G., RIVERA Z.S. & KENNEDY J.F. (1993). L-ascorbic acid: an overview. International Journal of Food Sciences and Nutrition 44: 59-72.

ROGERS E.M. (1983). Diffusion of innovations. The Free Press.

ROMIEU I., WILLET W.C., STAMPFER M.J., COLDITZ G.A., SAMPSON L., ROSNER P., HENNEKENS C.H. & SPEIZER F.E. (1988). Energy intake and other determinants of relative weight. American Journal of Clinical Nutrition 47: 406-12.

ROSENBERG I. (1994). Nutrient requirements for optimal health: What does that mean? The Journal of Nutrition 124: 1777S-1779S.

ROSENSTOCK I.M. (1974). Historical origins of the Health Belief Model. Health Education Monographs 2, 4: 328-335.

ROSKI J, PERRY C.L., McGOVERN P.G., WILLIAMS C.L., FARBAKHSH K. & VEBLEN-MORTENSON S. (1997). School and community influences on adolescent alcohol and drug use. Health Education Research 12, 2: 255-266.

ROWLING L. (1996). The adaptability of the health promoting schools concept: a case study from Australia. Health Education Research 11, 4: 519-526.

RUCK N. (1980). 'Social influences on the diets of immigrant families' in Turner M. (Ed 1980): 137-140.

RUXTON C.H.S. & KIRK T.R. (1996). Energy and nutrient intakes in a sample of 136 Edinburgh 7-8 years olds: a comparison with United Kingdom dietary reference values. British Journal of Nutrition 75: 151-160.

SAUNDERS R. & RAHILLY S. (1990). Influences on intention to reduce dietary intake of fat and sugar. Journal of Nutrition Education 22, 4: 169-176.

SCHAEFER G. (1987 a). 'The total human health system' in Kelly & Lewis (eds 1987): 17-18.

SCHAEFER G. (1987 b). 'Twelve principles of life as a basis for a positive concept of health' in Kelly & Lewis (eds 1987): 19-26.

SCHAEFER G. (1979). Concept Formation in Biology: The Concept 'Growth'. European Journal of Science Education 1, 1: 87-101.

SCHAEFER G. (1994). Post-16 training and education in Europe. Biologist 41, 3: 123-125.

SCHNEEMAN B. (1994). Carbohydrates: Significance for energy balance and gastrointestinal function. The Journal of Nutrition 124: 1747S-1753S.

SCHWARTZ J. (1996). The dual roles of nutrients as antioxidants and prooxidants: Their effects on tumor cell growth. Journal of Nutrition 126: 1221S-1227S.

SCHWARZER R. & FUCHS R. (1995). 'Changing risk behaviours and adopting health behaviours: The role of self-efficacy' in Bandura (1995, Ed): 259-287.

SEAMAN C. & KIRK T. (1995). A new approach to nutrition education in schools. Health Education 3: 31-33.

SEAMAN G., WOODS M. & GROSSET E. (1997). Attitudes to healthy eating among Scottish school children. Health Education 1: 19-22.

SEEMAN M. & SEEMAN T. (1983). Health behavior and personal autonomy: A longitudinal study of the sense of control in illness. Journal of Health and Social Hehavior 24: 144-160.

SHAMSUDDIN A. (1995). Inositol Phosphates Have Novel Anticancer Function. The Journal of Nutrition 125, 3S: 725S-732S.

SHANNON B., BAGBY R., QI WANG M. & TRENKNER L. (1990). Self-efficacy: a contributor to the explanation of eating behavior. Health Education Research 5, 4: 395-407.

SHAW N., CHIN C. & PAN W. (1995). Vegetarian diet rich in soybean products compromises iron status in young students. The Journal of Nutrition 125, 2: 212-9.

SHEPHERD S. & SIMS L. (1990). Employing cognitive response analysis to examine message acceptance in nutrition education. Journal of Nutrition Education 22, 5: 215-219.

SHERMAN A. (1992). Zinc, copper, and iron nutriture and immunity. The Journal of Nutrition 122: 604-609.

SINGH V. (1992). A current perspective on nutrition and exercise. The Journal of Nutrition 122: 760-765.

SHOPE J.T., COPELAND L.A., MAHARG R., DIELMAN T.E. & BUTCHART A.T. (1993). Assessment of adolescent refusal skills in an alcohol misuse prevention study. Health Education Quarterly 20, 3: 373-390.

SINIGALIAS P.I. & TURNER S.A. (1997). 'Science across Europe': monitoring the procedures & outcomes of an innovative project. School Science Review: 78 (284): 23-28.

SKINNER J.D. (1991). Changes in students' dietary behavior during a college nutrition course. Journal of Nutrition Education 23, 2: 72-75.

SMITH C., ROBERTS C., NUTBEAM D. & MACDONALD G. (1992). The health promoting school: progress and future challenges in Welsh secondary schools. Health promotion international 7, 3: 171-179.

SMITH J.L. & LOPEZ L.M. (1991). The application of theory and its relationship to program effectiveness in nutrition education research. Journal of Nutrition Education 23, 2: 59-64.

SOLOMON J (1991). 'Dilemma of Science, Technology and Society Education' in Fensham P (ed 1991): 273-280.

SORENSEN G., STODDARD A. & MACARIO E. (1998). Social support and readiness to make dietary changes. Health Education & Behavior 25, 5: 586-598.

SPOEHR K. (1994). 'Enhancing the acquisition of conceptual structures through hypermedia' in McGilly K. (1994 ed): 75-85.

STOCKLEY L (1993). The promotion of healthy eating: a basis for action. Health Education Authority.

SUBAR A. F., THOMPSON F. E., SMITH A. F., JOBE J. B., ZIEGLER R.G., POTISCHMAN N., SCHARZKIN A., HARTMAN A., SWANSON C., KRUSE L., HAYES R., RIEDEL LEWIS D. & HARLAN L. C. (1995). Improving food frequency questionnaires: A qualitative approach using cognitive interviewing. Journal of the American Dietetic Association 95: 781-788.

SUSSMAN S. (1991). Curriculum development in school-based prevention research. Health education research 6, 3: 339-351.

TERRY R.D., OAKLAND M.J. & ANKENY K. (1993). Factors associated with adoption of dietary behavior to reduce heart disease risk among males. Journal of Nutrition Education 23: 154-160.

THE ROYAL SOCIETY OF MEDICINE (1995). Leaflet for a meeting held on 23 Februrary 1995, 'Backache, Bamboo spine and diet'. Forum on Food and Health

THE NATIONAL ANKYLOSING SPONDYLITIS SOCIETY (1995). A Guidebook for Patients. Burleigh Press Ltd, Bristol.

THIER H.D. (1987). 'Using advertisements as a learning technique' in Kelly & Lewis (eds 1987): 148-151.

THIER H.D. (1987). 'Two Health Education projects from the Lawrence Hall of Science' in Kelly & Lewis (eds 1987): 162-163.

THOMAS J. (1980). 'The relationship between knowledge about food and nutrition and food choice' in Turner M. (Ed 1980): 161-167.

THOMSEN P. V. (ed.) (1986). Science Education and the History of Physics. Proceedings of the multinational teacher/teacher trainer conference at the Deutsces Museum, Munich, May 3rd - 9th, 1986. Centre for studies in Physics Education Institute of Education University of Aarhus.

TONES K. (1987). 'Health promotion, affective education and the personal-social development of young people' in David K. & Williams T. (Eds 1987): 1-43.

TONES K. (1993). The importance of horizontal programmes in Health Education (Editorial). Health Education Research 8, 4: 455-459.

TONES K. (1996). The health promoting school: some reflections on Evaluation (Editorial). Health Education Research 11, 4: i-viii.

TONES TILFORD (1994). Health Education.

TRICHOPOULOU A., LAGIOU P. & TRICHOPOULOS D. (1994). Traditional Greek diet and coronary heart disease. Journal of Cardiovascular Risk 1: 9-15.

TURNER A.S. & INGLE R.B (Eds) (1985). New developments in nutrition education. Nutrition Education Series Issue 11 UNESCO.

TURNER M. (Ed) (1980). Nutrition and lifestyles. London: Applied science publishers

TURNER S.A. (1987). 'Teaching About Nutrition in Primary and Secondary Schools' in Rao A.N. (Ed 1987): 71-83.

VAN HORN L., BUJNOWSKI M., SCHWABA J., MATHIEU-HARRIS M., DONATO K. & CLEEMAN J. (1995). Dietitans' contributions to cholesterol education: A decade of progress. Journal of the American Dietetic Association 95, 11: 1263-1267.

WALKER A. (1985). 'Nutrition education for food scientists' in Turner A.S. & Ingle R.B (Eds 1985): 111-118.

WARDLE J. & HUON G. (2000). An experimental investigation of the influence of health information on children's taste preferences. Health Education Research Theory & Practice 15, 1: 39-44.

WATSON R. (1980). 'Psychological influences on eating behaviour' in Turner M. (Ed 1980): 49-51.

WEAVER C. & RAJARAM S. (1992). Exercise and iron status. The Journal of Nutrition 122: 782-787.

WEBB G.P. (1992). A critical survey of methods used to investigate links between diet and disease. Journal of Biological Education 26, 4: 263-271.

WEBER CULLEN K., BARANOWSKI T., RITTENBERRY L. & OLVERA N. (2000). Social - environmental influences on children's diets: results from focus groups with African-, Euro- and Mexican-American children and their parents. Health Education Research Theory & Practice 15, 5: 581-590.

WELCH G.R. (1991). Thermodynamics and living systems: Problems and paradigms. The Journal of Nutrition 121: 1902-1906.

WELSH S. (1994). Atwater to the present: Evolution of nutrition education. The Journal of Nutrition 124: 1799S-1807S.

WHEELER E. (1985) 'Realism in Nutrition Education' in Turner A.S. & Ingle R.B (Eds 1985): 22-28.

WHICHELOW M.J. (1988). Which foods contain dietary fibre? The beliefs of a random sample of the British population. European Journal of Clinical Nutrition 42: 945-951.

WHITE A.A., SKINNER J.D. (1988). Can goal setting as a component of nutrition education effect behavior change among adolescents? Journal of Nutrition Education 20, 6: 327-335.

WILLIAMS T. (1987). 'Health Education in European Schools' in Kelly & Lewis (eds 1987): 123-128.

WILLIAMS T. (1987) 'Health education in secondary schools' in David K. & Williams T. (Eds 1987): 61-85.

WILLIAMS T. (1987). 'The Career-Line in Health Education' in Kelly & Lewis (eds 1987): 99-102.

WILLIAMS P.G. (1996). Vitamin retention in cook/chill and cook/hot-hold hospital foodservices. Journal of the American Dietetic Association 96: 490-498.

WISE A., FARMER L., MACKENZIE S. & McLEISH A. (1996). The structure and content of nutrition education messages. Journal of Human Nutrition and Dietetics 9: 117-126.

WORLD HEALTH ORGANIZATION (1990). Diet, nutrition and the prevention of chronic diseases. WHO Geneva.

WORLD HEALTH ORGANIZATION (1996). World health statistics Annual 1995. WHO Geneva.

WRIEDEN W.L. & MOORE E.J.H. (1998). The impact of a food and health education programme on the dietary habits of young Scottish adolescents. International Journal of Health Promotion & Education 36, 4: 103-107.

YOUNG A.L. & ASNER M.R. (1996). A government agency's responsibility to the consumer. Journal of Nutrition 126: 1010S-1012S.

ZEITLIN M.F. (1985). 'The two worlds of nutrition education: Similarities and differences between industrialized and developing countries' in Turner A.S. & Ingle R.B (Eds 1985): 45-57.

ZIEGLER R., SCHEIDT-NAVE C. & SCHARLA S. (1995). Pathophysiology of Osteoporosis: Unresolved Problems and New Insights. Journal of Nutrition 125: 2033S-2037S.

2. GREEK LITERATURE

ΑΡΓΥΡΗΣ Ι. & ΚΑΒΟΥΡΑΣ Α. (1995). Ανθρωπολογία Α' Γυμνασίου. Οργανισμός Εκδόσεως Διδακτικών Βιβλίων.

ΓΕΩΡΓΙΑΔΗΣ Ε., ΑΛΙΦΕΡΗΣ Κ., ΠΑΠΑΝΔΡΕΟΥ Λ., ΜΑΝΤΖΩΡΟΣ Χ. & ΤΡΙΧΟΠΟΥΛΟΣ Δ. (1993). Ανάστημα, βάρος και παχυσαρκία των Ελλήνων. Διαχρονική συγκριτική μελέτη με τα προ 25ετίας δεδομένα. Ιατρική 63: 272-276.

ΔΙΚΑΙΑΚΟΥ Ε., ΖΑΦΕΙΡΟΠΟΥΛΟΥ Α., ΜΑΡΙΝΟΥ-ΒΕΛΕΝΤΖΑ Α., ΧΑΣΑΠΙΔΟΥ-ΠΑΓΚΑΛΟΥ Μ. & ΨΑΡΡΑ-ΔΗΜΗΤΡΙΕΦ Μ. (1999). Οικιακή Οικονομία Β΄ Γυμνασίου. Οργανισμός Εκδόσεως Διδακτικών Βιβλίων.

ΚΑΡΑΛΗ Γ. (1995). Το γρήγορο βάδισμα είναι φάρμακο. Το άλλο ΒΗΜΑ 3/9/95: 19.

ΚΑΡΑΛΗ Γ. (1996). Καφέ ή τσάι; Τσάι, τσάι... Το άλλο ΒΗΜΑ 3/3/96: 29.

ΚΑΡΑΜΑΝΟΣ Β. (1995). 'Παχυσαρκία μία διαρκής απειλή' in ΥΠΟΥΡΓΕΙΟ ΥΓΕΙΑΣ, ΠΡΟΝΟΙΑΣ ΚΑΙ ΚΟΙΝΩΝΙΚΩΝ ΑΣΦΑΛΙΣΕΩΝ (Ed. 1995): 63-65.

ΚΟΚΚΕΒΗ Ο., ΚΟΚΟΛΑΚΗ FADEL K., ΧΑΣΑΠΙΔΟΥ Μ. & ΔΕΚΑΒΑΛΛΑ Φ. (1999). Οικιακή Οικονομία Α΄ Γυμνασίου. Οργανισμός Εκδόσεως Διδακτικών Βιβλίων.

ΚΩΣΤΟΠΟΥΛΟΣ Τ., ΤΡΙΜΗΣ Δ., ΨΑΡΡΑ Α. & ΨΑΡΡΑΣ Δ. (2000). Η δίκη των χάμπουργκερ. Ιός της Κυριακής, (Κυριακάτικη Ελευθεροτυπία 10/12/00.

ΛΑΓΑΚΟΥ Ν., ΜΑΡΙΝΟΥ-ΒΕΛΕΝΤΖΑ Α., ΜΠΡΑΝΟΥ-ΤΖΑΝΕΤΟΥΛΑΚΟΥ Α. & ΠΡΟΥΝΤΖΟΥ-ΜΠΟΥΡΑ Α. (1999). Οικιακή Οικονομία Β΄ Γυμνασίου. Οργανισμός Εκδόσεως Διδακτικών Βιβλίων.

ΠΑΙΔΑΓΩΓΙΚΟ ΙΝΣΤΙΤΟΥΤΟ (1995). Οδηγιες Τευχος Γ. Οργανισμός Εκδόσεως Διδακτικών Βιβλίων.

ΣΥΝΤΩΣΗΣ Λ. (1995). Παν μέτρον άριστον και στη διατροφή. Το ΒΗΜΑ 30 Απριλίου 1995.

ΤΡΙΧΟΠΟΥΛΟΣ Δ., ΣΚΑΛΚΙΔΗΣ Ι., ΤΡΙΧΟΠΟΥΛΟΥ Α., ΤΟΥΛΟΥΜΗ Π. & ΣΟΥΛΙΟΥ Δ. (1989). Η υγεία των Ελλήνων: χθες, σήμερα, αύριο. Materia medica Greca 17, 4: 315-320.

ΤΡΙΧΟΠΟΥΛΟΥ Α. & ΛΑΓΙΟΥ Π. (1995). 'Οι επιπτώσεις των παραδοσιακών διαιτών στη δημόσια υγεία' in ΥΠΟΥΡΓΕΙΟ ΥΓΕΙΑΣ, ΠΡΟΝΟΙΑΣ ΚΑΙ ΚΟΙΝΩΝΙΚΩΝ ΑΣΦΑΛΙΣΕΩΝ (Ed 1995): 54-62.

ΥΠΟΥΡΓΕΙΟ ΕΘΝΙΚΗΣ ΠΑΙΔΕΙΑΣ ΚΑΙ ΘΡΗΣΚΕΥΜΑΤΩΝ (1998). Ενιαίο Λύκειο: Ενιαίο πλαίσιο προγράμματος σπουδών. ΠΑΙΔΑΓΩΓΙΚΟ ΙΝΣΤΙΤΟΥΤΟ

ΥΠΟΥΡΓΕΙΟ ΥΓΕΙΑΣ, ΠΡΟΝΟΙΑΣ ΚΑΙ ΚΟΙΝΩΝΙΚΩΝ ΑΣΦΑΛΙΣΕΩΝ (Ed.) (1995). Πρόληψη η μεγάλη λεωφόρος της υγείας. Υπουργείο Υγείας, Πρόνοιας και Κοινωνικών Ασφαλίσεων, Αθήνα.

ΦΡΑΓΚΟΣ Σ. (1995). Η φτώχεια σκοτώνει. Το ΒΗΜΑ 14 Μαΐου 1995.